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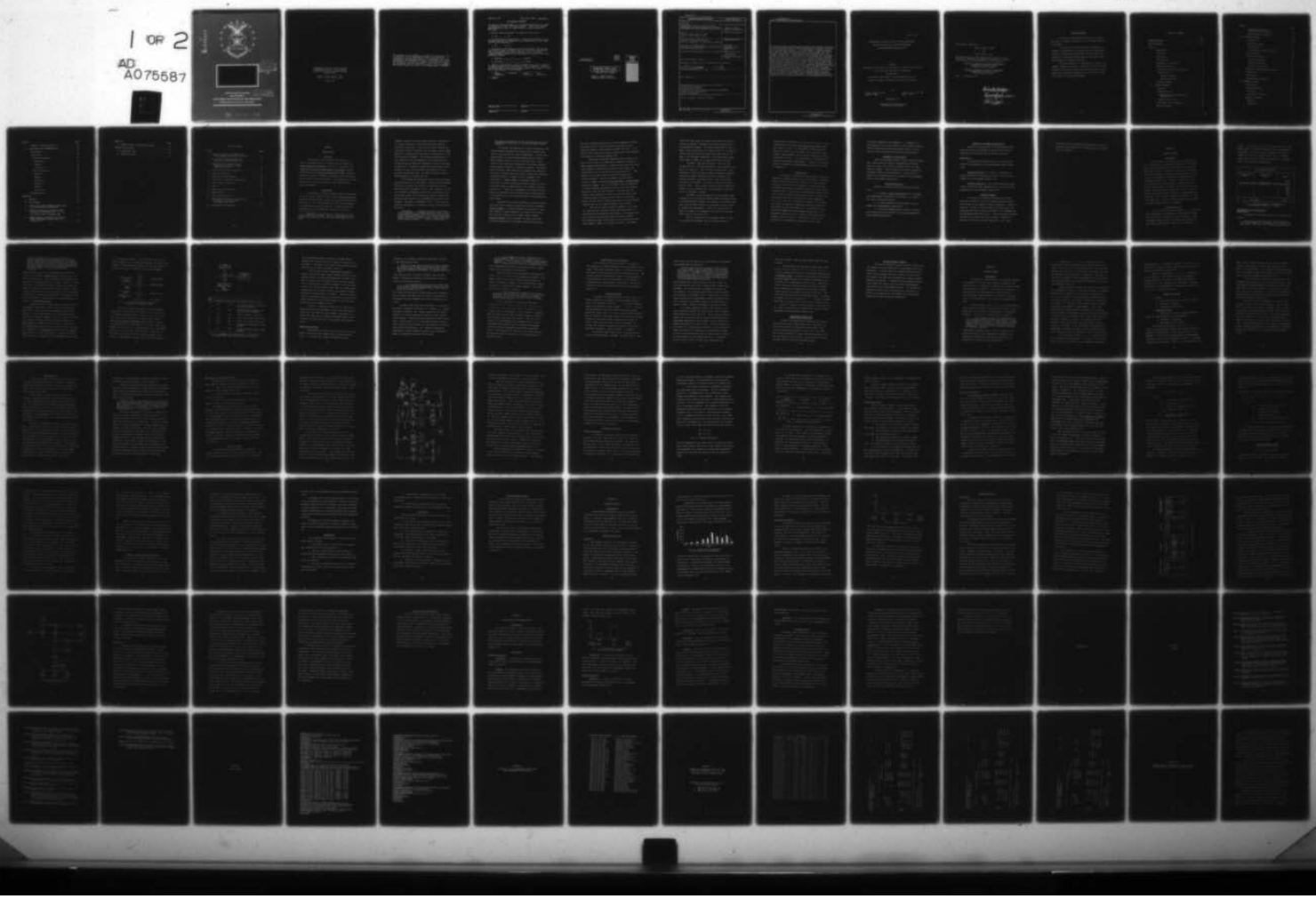

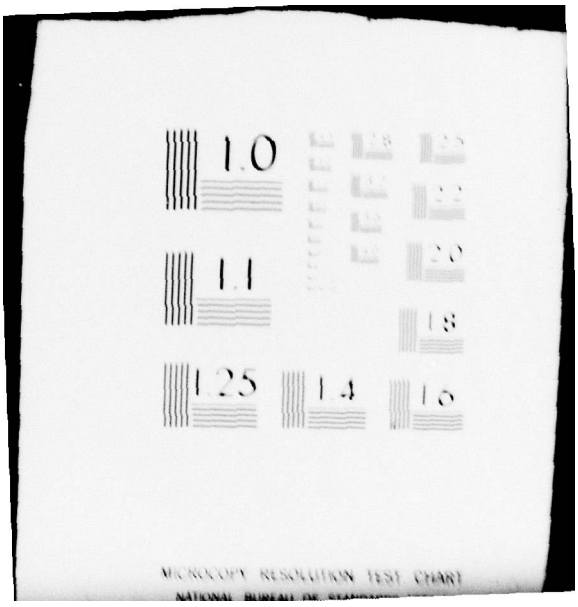
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Wright-Patterson Air Force Base, Ohio

COOPERATIVE LOGISTICS SUPPLY SUPPORT ARRANGEMENT PRICING RELATIONSHIPS BETWEEN PROGRAMMED AND NONPROGRAMMED REQUISITIONS

John A. Breed, Captain, USAF
James S. Winn, Major, USAF

LSSR 8-79B

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The United States Government participates with friendly countries in Foreign Military Sales (FMS) arrangements to enhance its objectives of peace and security. The Department of Defense usually will complete FMS contracts only after insuring that the foreign customer has adequately considered logistical support for the weapon systems sold. Supply Support Arrangements (SSA) are negotiated to provide this follow-on logistical support to countries who invest and participate in the U.S. defense logistics system. Under this arrangement, foreign governments are required to put up advance equity funds equal to a stated portion of the inventory items to be purchased for their needs. This causes items in the SSA to become programmed for foreign customers and should result in lower prices based on advanced procurement, shipments by the Item Manager below the control level, and exclusion of replacement pricing for programmed requisitions. The purpose of this thesis was to determine if a significant difference exists in final billing prices for programmed versus nonprogrammed Cooperative Logistics Supply Support Arrangement (CLSSA) requisitions and if prescribed pricing procedures were being implemented effectively.

LSSR 8-79B

COOPERATIVE LOGISTICS SUPPLY SUPPORT ARRANGEMENT PRICING RELATIONSHIPS BETWEEN PROGRAMMED AND NONPROGRAMMED REQUISITIONS

A Thesis

Presented to the Faculty of the School of Systems and Logistics

of the Air Force Institute of Technology

Air University

In Partial Fulfillment of the Requirements for the

Degree of Master of Science in Logistics Management

By

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September 1979

This thesis, written by

Captain John A. Breed

and

Major James S. Winn

has been accepted by the undersigned on behalf of the faculty of the School of Systems and Logistics in partial fulfillment of the requirements for the degrees of

MASTER OF SCIENCE IN LOGISTICS MANAGEMENT
(ACQUISITION LOGISTICS MAJOR)
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CHAPTER I

INTRODUCTION

Overview

"The country should be made fully aware of . . . higher procurement costs of non-SSA sales as compared to Supply Support Arrangements[1] [41:F-2]." Ostensibly, the Cooperative Logistics Supply Support Arrangement (CLSSA) should provide the Foreign Military Sales (FMS) customer a financially superior method for obtaining follow-on support from the United States Government. The primary goal of this thesis was to test the validity of this Department of Defense statement.

Background

The Cooperative Logistics Supply Support Arrangement is one of several forms of United States Security Assistance (SA) used to support this nation's foreign policy objectives. A key goal of U.S. foreign policy has been the achievement of international peace and security. Security Assistance legislation such as the National Security Act of 1947,

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[1]Appendix A is a glossary of terms generic to the subject area of this thesis. Words or terms defined in the glossary are underlined the first time they appear in the text.

commonly referred to as the Truman Doctrine, provided aid to foreign countries in the form of military defense articles and services. From the late 1940s through early 1960s most security assistance was furnished through Grant Aid (GA), a program which involved no reimbursement to the United States Government. The Foreign Assistance Act of 1961 (FAA-61) laid the foundation for current security assistance policy which has effected an overall reduction in Grant Aid. The FAA-61 authorized the President to sell defense articles and services to any country or international organization (32). By 1964 the dollar value of FMS exceeded that of Grant Aid (23).

The Foreign Assistance Act of 1961 and the Foreign Military Sales Act of 1968 (FMSA), retitled the Arms Export Control Act, provide the legislative authority for conducting Security Assistance (40:2). More recently, in 1976, in an effort to adequately control the international sales of military items, the International Security Assistance and Arms Export Control Act (ISA/AECA) was enacted by the Congress. The AECA, as amended in 1976, is the source of authority and policy for conducting Foreign Military Sales (41:I,A-1).

> [The AECA] . . . authorizes sales by the United States Government to friendly countries having a sufficient wealth to maintain and equip their own military forces at adequate strength, or to assume progressively larger shares of the costs thereof, without undue burden to their economies, . . . and in furtherance of

> the security objectives of the United States and of the purposes and principles of the United Nations Charter [31:271].

To enhance its objectives of peace and security, the United States Government participates with friendly countries in foreign military sales arrangements. In 1979, the United States Air Force (USAF) managed 828,819 items for FMS customers, worth 14.5 billion dollars (26). A key factor in the successful integration of military systems/ items between countries is logistical support. The Department of Defense (DOD) usually will complete FMS contracts only after insuring that the foreign customer has adequately considered logistical support for the equipment sold (41:III,F-1). Supply Support Arrangements (SSA) are negotiated to provide improved logistical support to countries who invest and participate in our defense logistics system (5:1). Under this arrangement, the foreign governments are required to put up advance equity funds equal to a stated portion of the inventory items to be purchased for their needs.

Foreign Military Sales customers are provided spare and repair part logistical support by two major programs. Initial support is provided through the delivery of a support package of spare components and repair parts coincident with the acquisition of a major weapons system. Follow-on support then is designed to insure continued in-country operation of the weapon systems acquired (4:2).

The term "Cooperative Logistics" has been adopted to reflect the mutual actions and relationships necessary for the effective support of FMS acquired systems (38:7-61). As of August 1979, thirty-five foreign countries were participating in cooperative logistics programs (24).

Department of Defense Instruction 2000.8 defines the policy and criteria for establishing Cooperative Logistic Supply Support Arrangements. CLSSAs provide effective logistical support by permitting the active participation by foreign countries in the DOD logistics system (39:1). The CLSSA is one of three types of spare and repair part follow-on support. Foreign customers also may obtain follow-on support through FMS Defined Order or Blanket Order requisition cases. Only in the CLSSA is the DOD permitted to conduct advance procurement actions to stock previously identified items for FMS customers. Defined Order and Blanket Order requisition cases for spare and repair part follow-on support usually are not filled from existing stock, and the foreign customer may expect increased supply leadtime and cost for smaller orders (36:2-25,4-37).

The U.S. Air Force identifies CLSSAs as "K" cases. "K" cases provide a foreign country the opportunity, in conjunction with prefunding requirements, to designate specific items to be prestocked within the DOD inventory. The CLSSA participant establishes a Foreign Military Sales Order Number 1 (FMSO I) or stock level case. The FMSO I

identifies those spare and repair parts which the DOD will procure and place in inventory for future requisition by the designated customer. The USAF managed $385 million of FMSO I stock level cases as of August 1979 (7). To process requisitions for spare and repair parts specified in its FMSO I, the customer establishes a Foreign Military Sales Order Number 2 (FMSO II) or requisition case (36:4-30).

The FMSO I case has two parts. Part A is the on-hand portion of the FMS requirements and represents five months of inventory. Part B is the on-order part of the requirement, which provides the DOD obligational authority necessary to award contracts required to maintain the foreign customer's inventory level. Cash is paid after acceptance of the FMSO I and equals 5/17ths of the total material value. Thus, foreign countries have an almost 30 percent initial investment for the programmed items identified in the FMSO I (42:18).

The FMSO II case represents the anticipated yearly consumption for the foreign customer under the CLSSA (42:18). It was established to permit the purchaser to withdraw spare parts from the USAF inventory to replenish initial stocks or support new requirements. FMSO II is set up only in terms of systems to be supported, the requisition period, and the dollar value (36:1-31).

FMSO II requisitions for prefunded (FMSO I) items are considered programmed, and the foreign customer's

requisition is processed on an equal priority basis as U.S. requisitions of the same Force Activity Designator (FAD) and urgency of need. "K" case FMSO II requisitions for items not identified in the FMSO I are designated nonprogrammed (unprogrammed) and are usually supported by direct procurement (36:4-3). All requisitions in other than "K" cases are considered nonprogrammed. Further clarification between programmed and nonprogrammed requisitions is made in Chapter II.

Justification

To evaluate the feasibility and value of conducting research to examine CLSSA pricing relationships, Lieutenant Colonel Ronald Dierker (15), Instructor of International Logistics at the Air Force Institute of Technology School of Systems and Logistics, helped coordinate a meeting with representatives of the School of Systems and Logistics, Air Force Logistics Command International Logistics Center, and the Defense Institute of Security Assistance Management (12; 19; 21; 23; 24). The general consensus at this meeting, based on individual experience and understanding of the CLSSA, was that there should be a difference in price between programmed and nonprogrammed requisitions, i.e., programmed requisition prices should be less than nonprogrammed requisition prices. Although this opinion was expressed, no documentation was known to exist which

accurately supported this assumption. In summary, all participants felt that the results of the proposed research would be beneficial and provide useful insight to help clarify current CLSSA pricing policies and procedures.

Statement of the Problem

Under a Cooperative Logistic Supply Support Arrangement, participants can define requirements and prefund spare and repair part follow-on support within the USAF logistics system. Limited research has been accomplished to examine CLSSA pricing procedures. A need exists to identify and evaluate pricing relationships for programmed versus nonprogrammed requisitions.

Research Objectives

Research is directed towards the following objectives.

1. To compare final billing prices for programmed and nonprogrammed requisitions to determine if a significant price differential exists.

2. To review CLSSA pricing procedures for programmed and nonprogrammed requisitions.

3. To develop recommendations related to current pricing policies and procedures for CLSSA programmed and nonprogrammed requisitions.

Hypothesis and Research Questions

Evaluation of programmed and nonprogrammed CLSSA requisitions was accomplished by testing the following hypothesis and answering the two related questions.

Hypothesis X

A significant difference exists in final billing prices for programmed versus nonprogrammed CLSSA requisitions.

Research Question 1. Is there a difference in actual procedures for determining billing prices for programmed and nonprogrammed requisitions?

Research Question 2. Have prescribed pricing procedures effectively been implemented for processing CLSSA programmed and nonprogrammed requisitions?

Research Summary

To achieve the research objectives, this study examined the CLSSA to test the stated hypothesis and provide answers to the specific research questions. Chapter II presents a review of related research to help clarify the prescribed and actual pricing procedures for programmed and nonprogrammed CLSSA requisitions. Past and present problems related to this study are also discussed. Chapter III describes the research methods employed in this study.

The results of the research are presented in Chapter IV followed by conclusions and recommendations for further study in Chapter V.

CHAPTER II

RELATED RESEARCH

Categories

To investigate the pricing policy and procedures for programmed and nonprogrammed requisitions in a CLSSA case, several categories of literature were researched. The first category of literature reviewed was Department of Defense directives, manuals, and regulations, to find a basis for accurate definitions of programmed and non-programmed requisitions. Secondly, theses, audits, and other studies were investigated to determine if other efforts had been made to identify and analyze the pricing policy and procedures for CLSSA requisitions. Thirdly, current messages, letters, handouts, and memorandums were examined to review present guidelines relating to pricing for CLSSA cases. Finally, ongoing studies were reviewed and expert source interviews conducted.

Literature Review

The literature review was beneficial in clarifying the relationship of programmed and nonprogrammed CLSSA requisitions for all types of follow-on support. CLSSA programmed requisitions and all other requisitions for spare repair part follow-on support are contrasted in

Figure 1. Only requisitions for items specified in a customer's FMSO I, established under a CLSSA, are designated programmed. All other follow-on support requisitions, whether for Blanket or Defined Order case, or a FMSO II CLSSA requisition for items not contained in a customer's FMSO I are considered nonprogrammed.

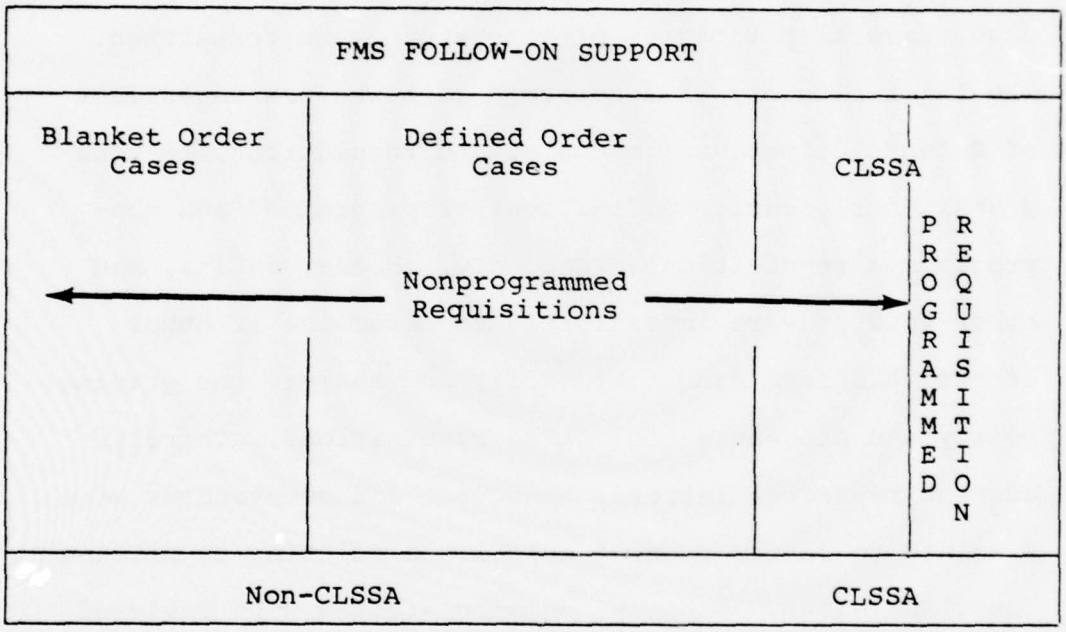


Fig. 1. Follow-on Support, Programmed and Nonprogrammed Requisition Interface

Programmed versus Nonprogrammed Requisitions

A Department of Defense directive on CLSSA pricing stated:

> Material provided under Supply Support Arrangements [programmed] will always be at the current standard price. There will be no downward adjustment due

> to age or condition nor any upward adjustment to reflect replacement pricing beyond that provided by stabilizing factors already included in the standard price. Requisitions in advance of achieving required inventory levels are not to be treated as Supply Support Arrangement requisitions [nonprogrammed] and are, therefore, subject to replacement pricing . . . [42:19-20].

This directive requires that programmed requisitions be billed at the current standard price as maintained in the DOD inventory system. This requirement for standard price billing for items specified in a customer's FMSO I is valid only after an appropriate leadtime (usually one year) has expired to provide increased DOD inventory levels. Requisitions submitted prior to the expiration of the designated leadtime are considered nonprogrammed. The directive further states that if requisitions are nonprogrammed they are subject to replacement pricing.

Further differentiation between programmed and nonprogrammed requisitions is made in Air Force Regulation (AFR) 400-3. Requisitions for programmed items will be honored to a zero depot balance for Uniform Material and Issue Priority System (UMMIPS) priorities 01-08 and Not Mission Capable for Supply (NMCS) requisitions and to the support level for UMMIPS priorities 08-15. Requisitions for nonprogrammed items will be filled from stock only when the inventory is in long supply position above the control level (36:4-31). The relationship of inventory level and the processing of programmed and nonprogrammed requisitions

is illustrated in Figure 2. The inventory level at the time a requisition is processed and whether the item is programmed or nonprogrammed, determine if the requisition is shipped from stock or filled from direct procurement.

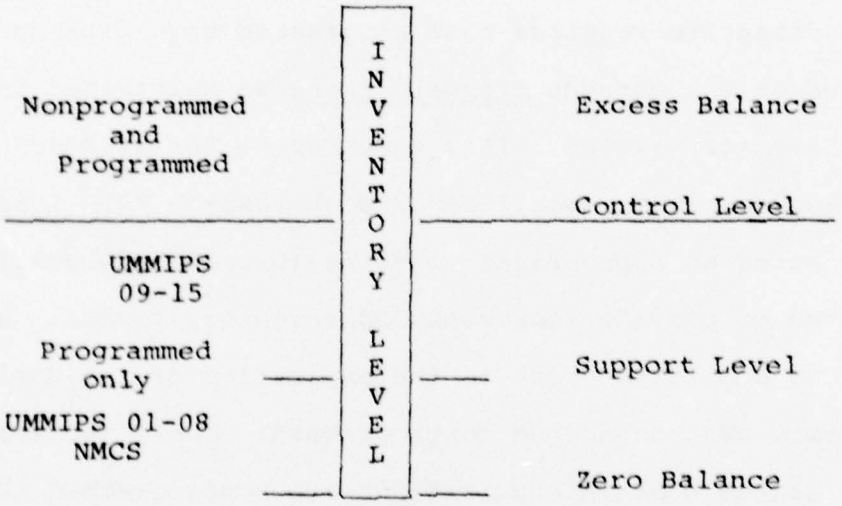
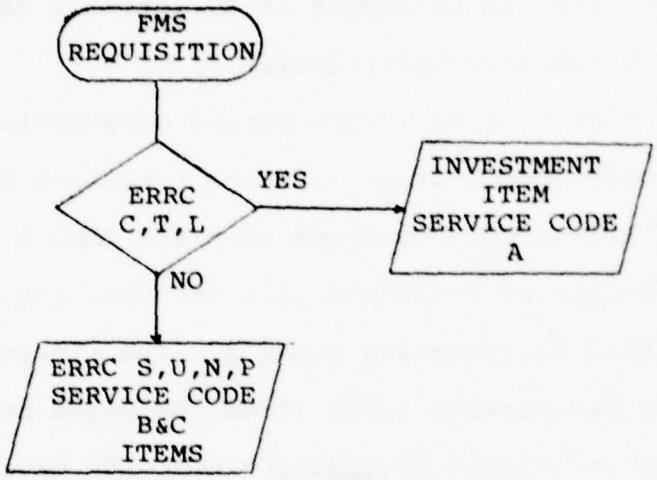


Fig. 2. Programmed and Nonprogrammed Fill Priorities and Inventory Level

To further examine programmed and nonprogrammed requisitions and how they are processed, Air Force Logistics Command supplements were inspected. Prior to 2 April 1979 recurring requisitions for service code A (USAF-managed recoverable investment) items (Figure 3) against the CLSSA requisition case (FMSO II) are only coded as programmed when the item being requested has been on the FMSO I case for one year or more and the quantity identified on individual requisitions does not exceed the FMSO I case quantity. Subsequent to 2 April 1979 a demand accumulator



ERRC Code	Expendable	Repairable	Management/Characteristics
C	Yes	Yes	Serialized control and reporting system (SCARS)
T	Yes	Yes	AF recoverable assembly management system (AFRAMS)
L	Yes	Yes	Line replacement unit (LRU)
P	Yes	Yes	Stock fund (except munitions)
N	Yes	No	Stock fund (except munitions)
S	No	Yes	AF equipment management system (AFEMS)
U	No	Yes	AF equipment management system (AFEMS)

Fig. 3. Expendability, Recoverability, Repairability Category (ERRC) Code Classification (38:24-46)

was established whereby individual programmed FMSO II requisitions could not exceed the total case quantity in the FMSO I. The USAF, as of August 1979, actively managed $195 million of CLSSA investment items (7).

Service code B items (USAF-managed consumable spares) and service code C items (Defense Logistics Agency-managed spares) are coded programmed when the FMSO I has been in existence for at least one year and when requisitions are submitted as recurring demands. The distinction is that only the recoverable spare items are coded nonprogrammed when the individual requisition quantity exceeds the quantity established in the FMSO I. Recurring requisitions for consumable items are controlled, not by the individual quantity of items requisitioned, but by the total dollar value of the FMSO I (4:33).

Finally, it should be noted that all nonrecurring requisitions and all non-CLSSA (non-"K" case) FMS requisitions are to be coded as nonprogrammed, highlighting the distinction made earlier between programmed CLSSA requisitions and all other follow-on requisitions (see Figure 1) (4:33).

CLSSA Pricing Policy

Investigation of current pricing policy was initiated by visiting the AFLC International Logistics Center (ILC). In a current ILC handout provided to foreign

customers, one statement concerning advantages of being in the CLSSA program said,

> There is a lower unit cost due to larger purchases. By including the customer's requirements with the U.S. Air Force worldwide requirements, the larger quantities being purchased often result in quantity discounts [5:3].

This advantage also is noted in handouts from the AFIT School of Systems and Logistics International Logistics Overview course which states,

> . . . the customer benefits by receiving the item at the least consolidated procurement cost rather than the high cost normally resulting from a small quantity urgent procurement [10:47].

This should be true based on CLSSA requisition procedures, but no research has been done to confirm or deny whether programmed and nonprogrammed prices are significantly different.

Further CLSSA policy was highlighted in a memorandum dated 5 November 1975 by Mr. W. P. Clement, Jr., Deputy Secretary of Defense. Mr. Clement emphasized the need to develop an accurate forecasting method for CLSSA customer supply support. Demand forecasting permits the DOD to procure in anticipation for U.S. and CLSSA customer requirements, insuring item availability and possible cost savings from quantity procurements. Mr. Clement addresses the importance of CLSSA customers defining their requirements (FMSO I programmed requisitions) and states,

> . . . that demands for items or quantities not in the Arrangement [FMSO I] will be treated as non-Cooperative Logistic Support Arrangement [nonprogrammed] demands; i.e., the requisition will be placed on back-order if assets are at or below the reorder point [13:2].

This memorandum reiterates the distinction that is made between the two types of requisitions.

Additional policy was evidenced in the August 25, 1978, *Report to Congress* by the Comptroller General. The report stated that once the foreign country places an equity investment on deposit in the United States Defense inventory, it qualifies for supply support. Then items may be requisitioned. Therefore,

> . . . items subsequently shipped to the foreign government should be priced at standard inventory cost, rather than replacement cost, because the foreign government has put up an equitable share to purchase from inventory [43:17].

In this same report, the revised DODI 2140.1 *Pricing and Sales of Defense Articles and Defense Services to Foreign Countries and International Organizations*, of 13 April 1978, was discussed. It was stated in the report that the DODI requires that inflation factors be added to the inventory price each year (43:13). This is in consonance with the ISA/AECA which provides that a foreign government must agree to pay the estimated replacement cost for articles purchased by the Defense Department (28:2). This requires the recovery of all costs that may be identified with a given sale of a defense article or defense service.

Significance to the Research

The preceding literature review is pertinent to the comparison of CLSSA programmed and nonprogrammed requisitions. They explicitly state there is a difference in the two types of requisitions and what the differences are. The findings show how the different types of requisitions are to be processed, and that replacement pricing should be accomplished for nonprogrammed requisitions. The use of inflation factors with replacement pricing is discussed in Chapter III.

Related Problems

A problem was identified prior to July, 1977, in a message concerning programmed and nonprogrammed requisitions. This message stated that ". . . the value of FMSO II should not exceed the value of FMSO I. . . [37]." A letter from HQ USAF/ACM stated that CLSSA requisitions, which exceed the dollar value of a country's requirements (FMSO I), must be treated as non-CLSSA requisitions unless the foreign customer increases his CLSSA consumption case (FMSO II) (25:1). Thus, when the dollar value of the FMSO I is reached, the customer's requisition should be filled as a non-CLSSA requisition, unless the FMSO I is updated.

An Air Force Audit Agency report identified difficulties in managing FMSO I and FMSO II dollar values. The

audit report clearly defines the relationship of programmed and nonprogrammed requisitions.

> Once the SSA has been established, FMSO II requisitions that match items on the FMSO I are considered programmed and are processed the same as an Air Force requisition. If a FMSO II requisition does not match an item on the FMSO I it is treated as unprogrammed. Each subsequent requisition of that item will be processed as programmed if the country has indicated it is a recurring requirement [33:15].

The statement above, which relates to dollar values for recurring service code B and C requisitions, reflects that the FMSO I will automatically be updated to include new requirements. This procedure permitting automatic update was eliminated in November, 1976. Elimination of this procedure insured that nonprogrammed recurring demands would not be treated as programmed requisitions identified in a country's FMSO I without investment in the DOD inventory.

In a study conducted by Myers and O'Grady, a comparison was made between "K" cases and "R" cases (Blanket Order Requisition cases) (36:4-37). Their objective was to compare the processing time for similar items processed as programmed requisitions in the CLSSA "K" case and nonprogrammed requisitions in the "R" case. Their conclusion was that there is no significant difference in the processing times and therefore no advantage in establishing a CLSSA, as far as receiving material earlier than foreign countries not participating in the program (22:1-20). A weakness in their study is that the same stock numbered items

were not compared. Thus the conclusions drawn could be invalid.

Investigation into the pricing principles of AFR 170-3, *Financial Management of the Security Assistance Program*, revealed new policy for procurement appropriation of secondary items. A change to the regulation recognized that replacement factors for secondary items need to be included in the established inventory price. Therefore, a current annual procurement account inflation percentage must be added to the standard inventory price of these items to arrive at the FMS selling price (35:3-2). AFR 170-3 excluded SSAs from this inflation factor. As stated in chapter four of the regulation, ". . . material provided under SSAs is always billed at the current standard price . . . [35:4-2]." Thus, no differentiation in pricing policy for a SSA is referenced, even though they consist of both programmed and nonprogrammed requisitions.

Concurrent Studies and Expert Source Interviews

Research concerning CLSSA requisition processing times and the overall CLSSA program were studied by two Air Force Institute of Technology thesis teams in the School of Systems and Logistics during 1979. The teams were Penley and Ratley in Class 1979A and Moradmand, Callahan and Johnson in Class 1979B. These concurrent studies provided insight into current CLSSA problems.

Related Research Summary

The related research provided valuable insight into the complexity of the CLSSA and its associated policy and procedures. It was evident that problems had been encountered with the program and still needed to be rectified. One subject, not previously addressed as a specific CLSSA problem, was pricing. It appeared that programmed requisitions should have lower unit prices than nonprogrammed requisitions due to replacement pricing. If the AFLC Air Logistics Center's (ALC) inventories are controlled as stated in the regulations, programmed and nonprogrammed requisitions should be priced differently.

CHAPTER III

RESEARCH METHOD

Introduction

The objective of this chapter is to specify methods and procedures for selecting, acquiring, measuring, and analyzing data to evaluate the hypothesis and research questions outlined in Chapter I. To achieve this objective, it was necessary that the appropriate classification of research design, specification of the types of variables used, and identification of the scales of measurement be made.

In this research, the *ex post facto* (after the fact) design was used to specify the sources and types of information which are relevant to the hypothesis and research questions. *Ex post facto* research may be defined as

> . . . that research in which the independent variable or variables have already occurred and in which the researcher starts with the observation of a dependent variable or variables. He then studies the independent variables in retrospect for their possible relations to, and effects on, the dependent variable or variables [18:360].

"Experimental" research design, which is used when the researcher controls and/or manipulates variables, was inappropriate because the analysis was based upon the examination of historical FMS requisitions.

A weakness of *ex post facto* design is that the researchers have no control over the variables used in the study. This is because the manifestations of the variables already have occurred. The researchers can report only what has happened or what presently is happening. Important in this type of research is the requirement that the variables not be influenced by the researcher because this could bias the situation (16:77-82).

Another weakness, besides the inability to manipulate the independent variables, is the lack of power to randomize. Although it is possible to draw subjects at random in *ex post facto* research, it is not possible to assign subjects to groups at random. The subjects already are assigned to the groups, i.e., national stock numbered items or requisitions type (programmed or nonprogrammed). Thus, self-selection has occurred whereby the members of the groups being studied are categorized, in part, because they possess different traits or characteristics. These characteristics possibly influence or relate to variables used in the research. This is different from experimental research where the researcher can use some method to manipulate the independent variables to observe if some concomitant variation takes place with the dependent variable (18:359-371).

A third weakness with *ex post facto* research is the risk of improper interpretation. The basis for this weakness is the lack of control of the independent variables to

effect changes in the dependent variable. The *ex post facto* investigator simply must take things as they are and try to discern the difference (18:361-371).

Despite its weaknesses, *ex post facto* research can be very valuable. This type of research is important because most social scientific and educational research problems do not lend themselves to experimental research, while many do lend themselves to controlled inquiry used in *ex post facto* research (18:372-373.

Research Variables

1. Price
    a. Operational definition: 1980 U.S. dollars.
    b. Treatment: Dependent.
    c. Measurement scale: Ratio.
2. Requisition Type
    a. Operational definition: FMSO programmed versus all other requisitions (nonprogrammed).
    b. Treatment: Independent.
    c. Measurement scale: Nominal.

The variables observed in this *ex post facto* research were prices and requisition types which are programmed or nonprogrammed. Prices were treated as the dependent variable, whereas programmed and nonprogrammed requisition type was the independent variable. Programmed requisitions, as stated in Chapter I, are designated in the

FMSO I under a CLSSA follow-on support case. All other follow-on requisitions for items not specified in the FMSO I are nonprogrammed. This research attempted to determine if programmed requisition prices are significantly different from nonprogrammed requisition prices.

In this research, nominal and ratio scales of measurement classifications for the variables were used. The programmed and nonprogrammed requisitions are nominal measures because no order, distance, relationship, or arithmetic origin can be specified. In addition, programmed and nonprogrammed requisitions are mutually exclusive and collectively exhaustive (16:112-113).

The ratio scale of measurement was used for the dependent variable--final billing prices in U.S. dollars. The ratio scale has the powers of nominal, ordinal (order) and interval (no absolute value of zero) scales, plus the concept of absolute zero or origin. This scale represents the actual amounts of a variable and indicates that one item is a multiple of any other item measured on the ratio scale. With this background into the types of measurement scales, variable specification, and explanation of research design, data selection for the research was considered (16:117).

Data Selection

The data for this research were selected from various FMS customer requisitions for recoverable investment items (service code A). In this research, consumable type items (service code B and C) were not considered due to time and data limitations.

Three specific follow-on support cases were examined. These were the "B" case (defined order spare), "R" case (blanket order spare parts), and the CLSSA "K" case. The requisitions in the Defined Order and Blanket Order spare parts cases are all nonprogrammed requisitions. Alternatively, CLSSA requisitions can be programmed or nonprogrammed. The programmed CLSSA requisitions were used in the analysis in comparison to all nonprogrammed requisitions (see Figure 1).

The data selected were secondary as opposed to primary. Primary data come from original sources of material which have not been previously collected. The data used in this study were secondary because they have been collected, but not examined for the same purposes as in this research. The advantages of using secondary data are that it can be secured quickly and without great expense. Disadvantages of secondary sources are that the validity may be diminished because of the time lag in producing it and the possible unavailability of data to meet specific research needs (16:175-176). Secondary source errors may also be

attributed to transposition or audit inaccuracies. These problems caused no problems for this research.

The data chosen represented accurately the characteristics of the population the researchers were measuring. Three important characteristics used in evaluating this data as a measurement tool were validity, reliability, and practicality (16:119).

> Validity refers to the extent to which a test measures what we actually wish to measure. Reliability has to do with the accuracy and precision of a measurement procedure . . . practicality is concerned with a wide range of factors of economy, convenience, and interpretability . . . [16:119-220].

Important considerations for data are whether the data have external validity and internal validity. The external validity for the data in this research refers to their generalization to the population. Internal validity refers to research design which accurately gauges what it attempts to gauge (16:120-126). The data were externally valid providing results applicable to all CLSSA requisitions for recoverable investment items. The data were internally valid in that the data permitted statistical analysis of the variables selected for examination. The data were reliable to the degree that they supplied consistent results. Finally, the data were practical in that they were affordable, easy to obtain and could be interpreted readily with little difficulty (16:120-126).

The Population and Sampling Plan

The population of interest consisted of national stock numbered items which met the following criteria:

1. The items had to be identifiable as both programmed or nonprogrammed requisitions.

2. The items were recoverable investment (service code A) type items.

3. The items were requisitioned in a sufficient number of cases to be statistically valid.

The sampling plan consisted of selecting stock numbered items which had been requisitioned independently at least thirty times as a programmed item and thirty times as a nonprogrammed item. This criteria met the requirement that the sample means be distributed normally based on the Central Limit Theorem. In addition, systematic sampling was used to insure a random selection of items when extensive stock number histories were available; otherwise, the sample was simple random. Thus the results can be generalized for all recoverable investment items which are programmed or nonprogrammed for follow-on support in the USAF inventory system.

Data Collection

The data were obtained from the International Logistics Center (ILC) at Wright-Patterson AFB, Ohio. The ILC personnel aided the researchers not only in collecting

the appropriate data, but in clarifying its contents and method of accumulation and transmission. The systems used to compute the data received from the ILC for this research are important, and their related functions require further explanation.

The International Logistics Centralized Accounting and Reporting System (HO51) is the data system used solely for the management and control of the Air Force Logistics Command's (AFLC) portion of the USAF International Logistics program (see Figure 4). The system was implemented in 1965 for Grant Aid and has been expanded to provide for major policy changes in U.S. International Logistics. The purpose of the system is to provide centralized program control for Security Assistance information and processing. It records and updates requisitions received from the country, passes to sources of supply FMS inventory requirements, and provides management reports (17).

The tie-in from the HO51 system to the ALCs is accomplished by the Stock Control and Distribution System (DO32). This system recognizes the coding from the HO51 system which identifies an item as programmed or nonprogrammed. If nonprogrammed, and inventory levels are below the control level, procurement action takes place and replacement pricing incurred. If programmed and below the control level, the DO32 system evaluates the current inventory status and the requisitions UMMIPS/NMCS priority (27).

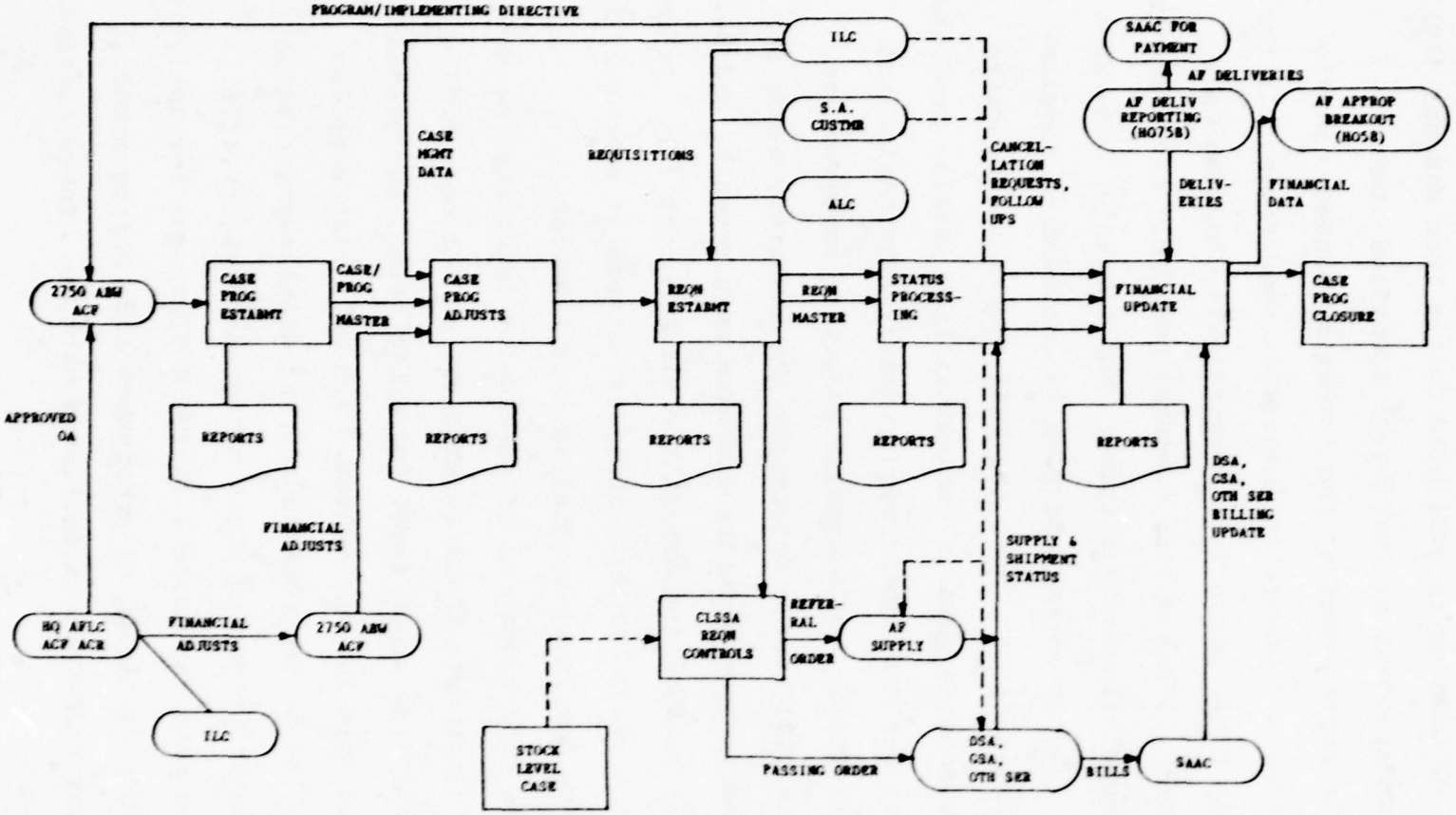


Fig. 4. Daily HQ51 Functional Flowchart [27]

Exception processing is available to the Item Manager (IM) to allow independent evaluation of specified items.

The system used by the inventory managers at the ALCs to compute recoverable investment requirements is the Recoverable Consumption Item Requirements Computational System (DO41). This system computes quarterly requirements for recoverable investment items. Additionally, DO41/HO51 interface insures an FMS additive is included in requirements determination. Thus, the DO41 system incorporates CLSSA requirements when it determines item levels, projects time-phased buy and repair requirements, termination and excess quantities, and forecasts budgetary requirements. In sum, the DO41 system determines the inventory needs for the customer, budgets future resource requirements, and has as its goal maximum support at the minimum cost (9). It is an important system in this analysis because it computed the requirements for items studied in this research.

The HO51 system is of particular importance because it directly supports CLSSA functions. It not only builds and maintains the stock level for CLSSA items, but provides centralized data for the system. The HO51 also supplies the capability to monitor and support CLSSA renegotiation in addition to producing CLSSA management reports (27).

The data extracted from the HO51 system for analysis in this study consisted of programmed and nonprogrammed requisitions from various foreign countries. Investigation

was initially accomplished to identify national stock numbered (NSN) items, which possibly had sufficient programmed and nonprogrammed requisitions to meet the statistical requirements of the sampling plan. An ILC/OOS developed summary report of "K" case demands from May, 1977, to May, 1978, provided a source of stock numbered items (6). Selected NSNs were interrogated through the HO51-RO61 Status of Selected Stock/Part Numbered Items report, which provided a ten-year requisition history for each stock numbered item. An audit of the RO61 report was then accomplished to identify those NSNs which complied with the sampling plan. Data extracted from the RO61 report included the delivery value per item (final billing price), the HO51 processing date, and designation as programmed or nonprogrammed for each NSN requisition. With this data base, the researchers conducted the statistical analysis.

Statistical Analysis

Classical Approach

In statistical analysis there are two approaches to hypothesis testing. These are the classical or sampling-theory approach and the Bayesian approach. The classical approach used in this study represents an objectivist view of probability in which the decisions made rest entirely on the analysis of sampling data (16:372). The test hypothesis is designed to determine if a significant difference exists

in final billing prices for programmed versus nonprogrammed CLSSA requisitions. This hypothesis was evaluated and ultimately accepted or rejected based on the sample data.

In the classical approach to hypothesis testing, a null hypothesis (H_o) is developed. The null hypothesis relates to a statement which says no difference exists between the parameters being compared. Any observed difference which is found is due only to random sampling fluctuations. The null hypothesis is formulated specifically to test for possible rejection. The opposite of the null hypothesis established for the comparison is the alternate hypothesis (H_a). It is usually the operational statement that the researchers desire to prove (16:374). The parameters compared in this analysis were the mean final billing prices for programmed (U_1) and nonprogrammed (U_2) requisitions for each of the NSNs selected for analysis (Figure 5).

$$H_o: \ U_1 = U_2$$

$$H_a: \ U_1 \neq U_2$$

Fig. 5. Research Hypothesis

The null hypothesis (H_o) states that no significant difference exists between the final billings, whereas the alternative hypothesis (H_a) identifies a significant difference between the final billing prices for the two requisition types.

In testing these hypotheses H_o is accepted if the analysis shows that the null hypothesis cannot be rejected. The alternate decision is to reject the null hypothesis, meaning there is a significant difference in the parameters. The test of the null hypothesis is illustrated in Figure 6 (16:374-375):

State of Nature / Decision	H_o is True (S_1)	H_o is False (S_2)
(A_1) (Accept H_o $U_1 = U_2$	Correct Decision	Type II error (B)
(A_2) Reject H_o $U_1 \neq U_2$	Type I error (α)	Correct decision

Fig. 6. Hypothesis Classifications

As shown, either one of two states of nature (S_1 or S_2) exists in the population. The null hypothesis is either true or it is false. Also, there are two decision alternatives whereby the null hypothesis is either accepted or rejected. Two situations lead to correct decisions, and the other two lead to decision errors. With the Type I error, a true hypothesis is rejected erroneously. The α value is called the level of significance and is the probability of rejecting an hypothesis that is true. Conversely,

with the Type II error, a null hypothesis is accepted incorrectly (16:375).

If H_o is accepted when it is true then a correct decision has been made. This is called the confidence level and refers to a confidence of $1-\alpha$ (44:355). The α error rate is preset, and in this research it was set at 5 percent. This means the confidence level was 95 percent.

Significance Tests

The two general classes of significance tests are parametric and nonparametric. The parametric tests are more powerful than the nonparametric tests and normally are used if certain assumptions can be met. Parametric tests of significance are made, using both the t-test and F-test, based on the following assumptions (16:380).

1. The selection of any one case does not affect the chances for another case to be included in the sample.

2. The observations should be taken from populations which are distributed normally.

3. The populations should have equal variances.

4. The measurement scales should be interval or ratio, so arithmetic operations can be used with them.

In this analysis it is assumed that these have been met, and parametric tests are appropriate. It should be noted that these assumptions have been tested empirically with populations which are artificial. The results show

that the significance tests hold up well even though actual conditions depart substantially from those required theoretically (16:380). With this information the researchers selected an appropriate statistical method for this study.

Analysis of Variance

The Analysis of Variance (ANOVA) parametric test was used in this research to discern if there were significant differences in the prices for programmed and nonprogrammed requisitions. This test was selected after consultation with Major Leslie J. Zambo, Assistant Professor of Quantitative Methods at the Air Force Institute of Technology (45).

The ANOVA test must have a dependent variable that is measured at least on a metric scale. The independent variables can be all nonmetric or combinations of nonmetric and metric variables (11:425). The variables in this study met this criteria. Prices, the dependent variable, were metric, and programmed and nonprogrammed requisitions, the independent variables, were nonmetric. The Statistical Package for the Social Science (SPSS) computer subprogram ONEWAY (11:422) was used to compute the ANOVA statistics from the data collected for the analysis.

An F-test was used to determine whether one group of programmed requisition mean final prices differed significantly from a group of nonprogrammed requisition mean

final prices for identical stock numbered items. This procedure required that a separate ANOVA test be accomplished for each of the stock numbered items considered in this study. The SPSS program designed for this research is presented in Appendix B. Per the sampling plan, at least thirty programmed and thirty nonprogrammed requisitions for each stock numbered item constituted the data base for each ANOVA test. Consequently, the total data file "SSADATA" was organized with a subfile structure. To compensate for inflationary effects over the ten-year period of requisitions examined, DOD Price Escalation Indices (34) were incorporated in the SPSS program to convert the HO51 final billing prices to 1980 constant year dollars. Additionally, the SPSS subprograms FREQUENCIES and SCATTERGRAM were used to analyze the dependent variables to determine if significant trends were identified over time for each stock numbered item.

The one-factor analysis of variance model was used to test the research hypothesis as stated in Chapter I. The null hypothesis (H_o: $U_1=U_2$) was rejected for each NSN when the programmed requisition mean price (U_1) was determined to be significantly different from the nonprogrammed requisition mean price (U_2). If the prices did not vary significantly, as determined by an F-test, the null hypothesis was accepted.

The one-factor analysis of variance model (Figure 7) examined the difference in mean prices caused by the single independent variable, requisition type (programmed or non-programmed).

$$X_{i_j} = \bar{\bar{X}} + R_i + e_{i_j}$$

where:

X_{i_j} = individual requisition price

$\bar{\bar{X}}$ = overall mean X_{i_j}'s

R = effects of independent variable

e_{i_j} = random error factor

Fig. 7. One-Factor, Fixed Effect ANOVA Model (20:44)

The one-factor model assumes that variables in prices were caused by a random or unexplained factor (e_{i_j}) while the overall mean ($\bar{\bar{X}}$) and the independent variable effect (R_i) remain constant. If the effect of the independent variable, requisition type (R_i), does not vary and the overall mean is constant, then the random factor must account for any variation between the requisition mean prices U_1 and U_2. Additionally, the four assumptions previously stated for the significance tests must be met.

Variation identified in the one-factor model was examined to determine if mean price differences were attributable to the requisition types or caused by random or

chance fluctuations. The total variation equation (Figure 8) is the basis for accomplishing the ANOVA comparison of mean prices and the ultimate acceptance or rejection of the null hypothesis.

Total Variation = Explained Variation + Unexplained Variation

$$\sum_{i=1}^{n}\sum_{i=1}^{k}(X_{i_j}-\bar{\bar{X}})^2 = n(\bar{X}_i-\bar{\bar{X}})^2 + \sum_{i}\sum_{j}(X_{i_j}-\bar{X}_i)^2$$

where:

X_{i_j} = individual requisition price

$\bar{\bar{X}}$ = overall mean of X_{i_j}'s

n = number cases per NSN

k = requisition type (1,2)

$\bar{X}_i$ = mean price, by requisition time

Fig. 8. Total Variation Equation (45:285)

To evaluate variation in the one-factor ANOVA model, a comparison of variances was accomplished via an F-ratio. This ratio (Figure 9) examined the variance in prices between the two requisition types and variance inherent within each requisition type group.

$$F = \frac{\text{Variance Between Groups}}{\text{Variance Within Groups}}$$

Fig. 9. F-Ratio (44:285)

Variance between mean requisition prices U_1 and U_2 was explained by the effects of the independent variable

requisition type. Variance within each group of like requisitions is unexplained because it is caused by random fluctuation. The variance between and within groups was calculated by taking the variations identified in Figure 8 and dividing each by its corresponding degrees of freedom. In this one-factor analysis the total degrees of freedom was the number of requisitions in each individual NSN sample. The degrees of freedom between groups was one and the degrees of freedom within groups was one less than the total degrees of freedom. The F-ratio provided a relative comparison of the variances in the ANOVA model to determine if the requisition type affects the final billing price for an individual stock numbered item.

The SPSS subprogram ONEWAY was used to compute a one-factor analysis of variance problem for each of the stock numbered items selected for this study. The computed F-ratio for each NSN was then compared to an F-critical value for the preset error rate (α) of .Ø5. The F-critical is based on a unique F distribution for the degrees of freedom within groups. The error rate (α=.05) segments the F-distribution so that 5 percent of the distribution is beyond the identified critical point. This region represents the area of type I error (Figure 6), rejecting the null hypothesis when it is true.

In summary, if the computed F-ratio is less than the F-critical value, the null hypothesis of equal means

(H_o: $U_1=U_2$) cannot be rejected. Thus, it is concluded that the mean final billing prices for programmed and nonprogrammed requisitions are equal, and any variation in the means is caused by chance. If the F-critical value is exceeded, then the null hypothesis must be rejected, and the alternate hypothesis accepted (H_a: $U_1 \neq U_2$). In this case the difference in price means is caused by the effect of the requisition type, either programmed or nonprogrammed.

Results of the analysis of variance test of the research hypothesis for each selected stock numbered item was summarized as a simple percentage; cases when the null hypothesis was accepted (programmed = nonprogrammed); cases when the null hypothesis was rejected (programmed ≠ nonprogrammed). Additionally, when the null hypothesis was rejected, comparison of the mean prices for each requisition type was made to determine if the programmed requisition mean price was less than or greater than the nonprogrammed mean price.

Design to Answer Research Questions

The statistical analysis, designed to test the hypothesis that a significant different exists in final billing prices for programmed versus nonprogrammed requisitions, also gave insight into answering the research questions. The first question investigated whether there is a

difference in actual procedures for determining billing prices for programmed and nonprogrammed requisitions. The second research question concerns the effective implication of prescribed procedures for processing CLSSA programmed and nonprogrammed requisitions. To answer these questions, a review of CLSSA pricing procedures was required.

To evaluate pricing procedures, the researchers investigated factors that are considered when pricing CLSSA requisitions. The research was limited to procedures for recoverable investment items, to be consistent with the research hypothesis. Analysis focused specifically on those pricing factors which influenced the results obtained by the analysis of variance examination of final billing prices.

To answer the first research question, established pricing procedures were examined. Policy developed for "K"-case transactions permits the U.S. Government to acquire inventory items in anticipation of prespecified FMS customer requirements. This unique provision of the CLSSA distinguishes it from other FMS cases. Additionally, all costs must be recouped by the U.S. while conducting FMS. These two factors directly influence pricing procedures for programmed and nonprogrammed requisitions. To review CLSSA pricing procedures, a decision flow chart was developed to depict those factors that are considered in computing final

billing prices for programmed versus nonprogrammed requisitions.

To address the second research question, the results of the hypothesis test were examined in relation to pricing procedures delineated by the decision flow chart developed to answer question one. Furthermore, interviews with individuals knowledgeable of pricing procedures were conducted to determine if established procedures had been implemented correctly.

Methodology to test the research hypothesis and answer the research questions is based on specific assumptions and constrained by limitations defined by the researchers.

Assumptions

The assumptions under which this research was conducted were as follows:

1. The samples used in the statistical analyses were representative of the population.

2. The data received from the RO61 Status of Selected Stock/Part Numbered Items report were accurate.

3. The information received in all personal interviews was accurate.

4. The use of inflation indices in this research is applicable to adjust requisition prices over the ten-year time period.

5. Item managers' responsibilities for CLSSA pricing were met in accordance with prescribed policies and procedures.

6. Limitations listed below do not affect the validity, reliability and accuracy of the research results.

Limitations

The limitations under which this research was conducted were as follows:

1. The results were confined to the U.S. Air Force CLSSA and could not be used to assess Supply Support Arrangements for other military services.

2. The results were not weighed to evaluate the advantages or disadvantages for either the United States or foreign country participants in the CLSSA.

3. Only one set of data was used in the analysis due to time restrictions for completion of the research (recoverable investment items, service code A).

4. Changes in CLSSA pricing policies and procedures during the ten-year history of requisitions examined did not invalidate the research findings.

5. Inability to obtain matched (programmed and non-programmed) requisitions on identical dates did not adversely effect this research analysis.

Research Method Summary

In this chapter the basis for testing the research hypothesis and research questions was established. The data selection process, data collection method, and data analysis procedures employed to achieve the objectives of this research were discussed. The next part of the chapter explained the appropriate statistical techniques and method used to analyze the mean final prices for programmed and nonprogrammed requisitions to determine if a significant difference exists.

The design to answer the research questions was established to evaluate pricing procedures. This design was used to compare prescribed procedures for processing CLSSA programmed and nonprogrammed requisitions. Finally, the assumptions and limitations of this research were stated. This completes the research method. The results of the implementation of the research method are presented in Chapter IV.

CHAPTER IV

RESEARCH RESULTS

Introduction

The methodology designed to test the research hypothesis and answer the research questions was implemented. Initially stock numbered items were selected in accordance with the sampling plan. An individual ANOVA test was accomplished for each NSN selected, and the statistical results analyzed. Finally, the research questions were addressed, and answers proffered.

Research Hypothesis

Data Base

The summary report of "K"-case demands provided by the International Logistics Center Office of Operations and Standardization (6) was reviewed, and approximately 300 stock numbered items were identified as having a high number of requisitions processed during a twelve-month period. These NSNs were then interrogated via the HO51-RO61 Status of Selected Stock/Part Numbered Items Report. Ultimately, 34 recoverable investment type items were selected in accordance with the sampling plan (Appendix C); there were at least 30 programmed and 30 nonprogrammed requisitions for each NSN. A total of 2488 requisitions

(1222 programmed, 1266 nonprogrammed) were selected and constituted the research data file.

Examination of the 2488 requisition dates showed a definite distinction between programmed and nonprogrammed requisitions. The data base contained programmed requisitions for each of the years 1970—1979 (Figure 10). Programmed requisitions constituted a majority of the requisitions in the years 1976 through 1979. Nonprogrammed requisitions accounted for all requisitions prior to 1976.

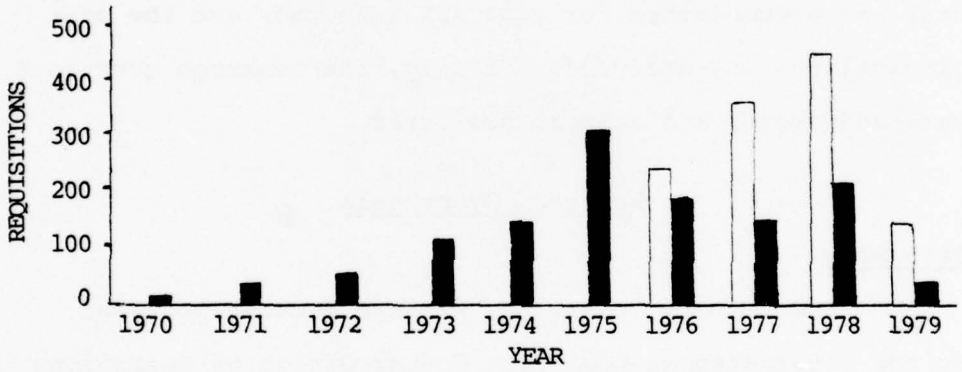


Fig. 10. Requisition Distribution
(solid bars are nonprogrammed)

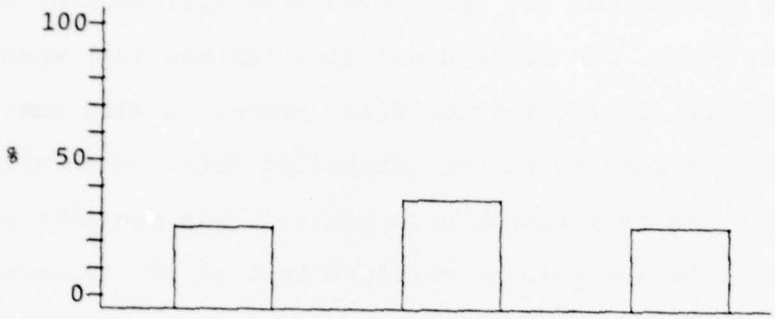
The uneven distribution of requisition types over the ten years of data identifies the difficulty encountered in attempting to find matched programmed and nonprogrammed requisitions. Ideally, the researchers desired to use programmed and nonprogrammed requisitions matched by dates. It was found that this was not possible and still comply with the sampling plan.

To correct for the identified time differential for requisition types, DOD Price Escalation indices (34) were used to convert all requisition final prices to 1980 constant dollars according to the processing date. With all prices converted to a single base year, it was possible to proceed with the analysis of variance test of the research hypothesis.

Analysis of Variance

A one-factor analysis of variance test was performed on the collected data for each of the 34 selected stock numbered items. The variance between and within groups was computed, and the F-ratio determined. The F-ratio was then compared to the corresponding F-critical (α=.05) value to test the null hypothesis of equal means (H_o: $U_1=U_2$). Appendix D contains a summary of results for the ANOVA tests.

Figure 11 graphically depicts the results of the research hypothesis test. In 15 cases (44.12 percent), the null hypothesis was accepted, and no significant difference was identified between programmed and nonprogrammed mean final billing prices. The remaining 19 cases, in which a significant difference in mean final billing prices was identified and the null hypothesis rejected, were analyzed further to determine the relationship of the price means. Ten cases (29.41 percent) had programmed mean prices



				Totals
Count:	10	15	9	34
Percent:	29.41	44.12	26.47	100.00%

Fig. 11. ANOVA Results

less than the nonprogrammed mean price, and nine cases (26.47 percent) had programmed mean prices greater than the nonprogrammed mean price. Therefore, 55.88 percent of the NSNs examined showed that a significant difference existed between programmed and nonprogrammed, and the null hypothesis was rejected.

Although the results of this analysis indicated a significant difference between programmed and nonprogrammed requisition final billing prices, no set pricing pattern was evidenced. Thus, it was not possible to conclude that programmed items cost less than identical nonprogrammed items. Similar results, based on requisition for only 1976 through 1979, are summarized in Appendix E.

Research Questions

Question 1

The first research question investigated pricing procedures to determine if programmed and nonprogrammed requisitions should be priced differently. FMS pricing procedures for Air Force managed recoverable investment items are governed by DODI 2140.1, AFR 400-3, AFR 170-3, and AFLCM 177-1, Part Seven (HO75B).

A fundamental factor which distinguishes programmed and nonprogrammed requisition billings is replacement pricing. Programmed requisitions are billed at the current standard price, whereas nonprogrammed requisitions are billed at the replacement price. The replacement price is computed from the current standard price plus an additive to reflect increased costs to reprocure an item shipped from stock.

The HO75B, Subsystem for FMS/GA Delivery Reporting, reports delivery and creates a billing based upon the requisition, shipment, and confirmation of shipment. This subsystem, formerly the DO29 for Grant Aid and more recently the HO28 for Grant Aid and FMS, automatically creates applicable reportings and billings. Inputs to the HO75B are provided through interaction with the JOO5B, Standard Price Review System, using the JO41, Acquisition Support and Due-In System and D143B Standard Price Subsystem (8:07-A-2). Replacement pricing is directed by AFR 170-3 that requires

the Item Manager to apply inflation factors manually to the standard price for non-CLSSA requisitions. Via the DO32, Item Manager Stock Control and Distribution System, the IM provides replacement pricing data for the JOO5B which will update indirectly the HO75B automatic billings (Figure 12) (3).

Billing procedures, established by AFR 170-3, require the inclusion of inflation indices to approximate replacement pricing although CLSSA requisitions are excluded. ". . . Material provided under SSAs is always billed at the current standard price [45:4-2]." No differentiation is made, however, between programmed and nonprogrammed requisitions in a SSA. Consequently, all CLSSA requisitions are treated as programmed, and replacement pricing is not incurred for nonprogrammed items. The HO75B computes billing for SSA and non-SSA requisitions but does not distinguish between programmed and nonprogrammed SSA requisitions.

The researchers interviewed AFLC Accounting and Finance personnel responsible for FMS (14). The inability to distinguish between programmed and nonprogrammed requisitions for pricing procedures governed by AFR 170-3 was verified. DODI 2140.1, which specifies FMS pricing guidelines, does not address nonprogrammed CLSSA requisitions, only non-CLSSA requisitions. The Air Force regulation,

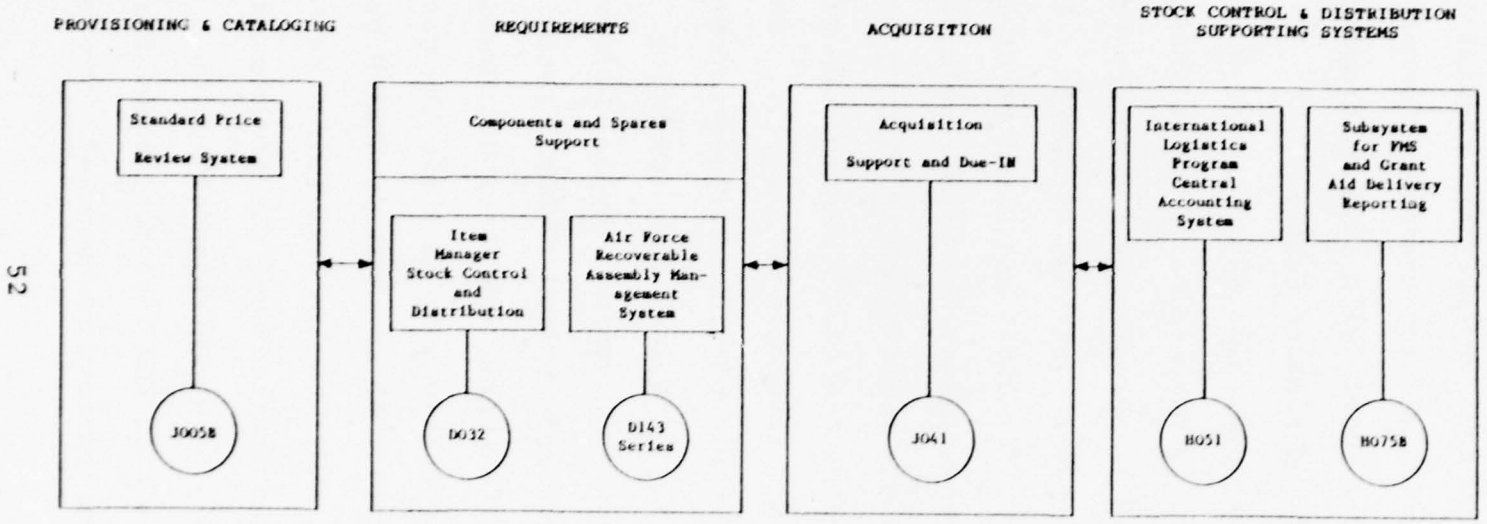


Fig. 12. Data Systems Interface (3)

using DODI 2140.1 terminology, was not expanded to differentiate programmed and nonprogrammed requisitions within an Air Force SSA. Air Force Logistics Command personnel submitted a letter identifying this discrepancy to the Air Force Accounting and Finance Center.

Air Force Regulation 400-3, which governs Air Force managed FMS operations, does not reflect the problems identified in AFR 170-3. Programmed and nonprogrammed requisitions are broken out as a subset of CLSSAs. Thus, Air Force pricing procedures for CLSSA requisitions do distinguish between programmed and nonprogrammed requisitions.

To highlight differences in pricing procedures for recoverable investment items, a requisition pricing decision flow chart was developed (Figure 13). This decision chart identified three possible billing outcomes: replacement price, actual price, and standard price. For programmed requisitions--inventory levels, Uniform Material Movement Issue Priority System (UMMIPS) priorities, and Not Mission Capable Supply (NMCS)--requirements must be considered. If the inventory is above the control level, or UMMIPS priority 01-08 or NMCS, or UMMIPS priority 09-15 and inventory is above the support level, or the item is procured on a consolidated buy, the programmed requisition should be billed at the standard price. For a nonprogrammed requisition and inventory above the control level, replacement pricing is required. The actual price

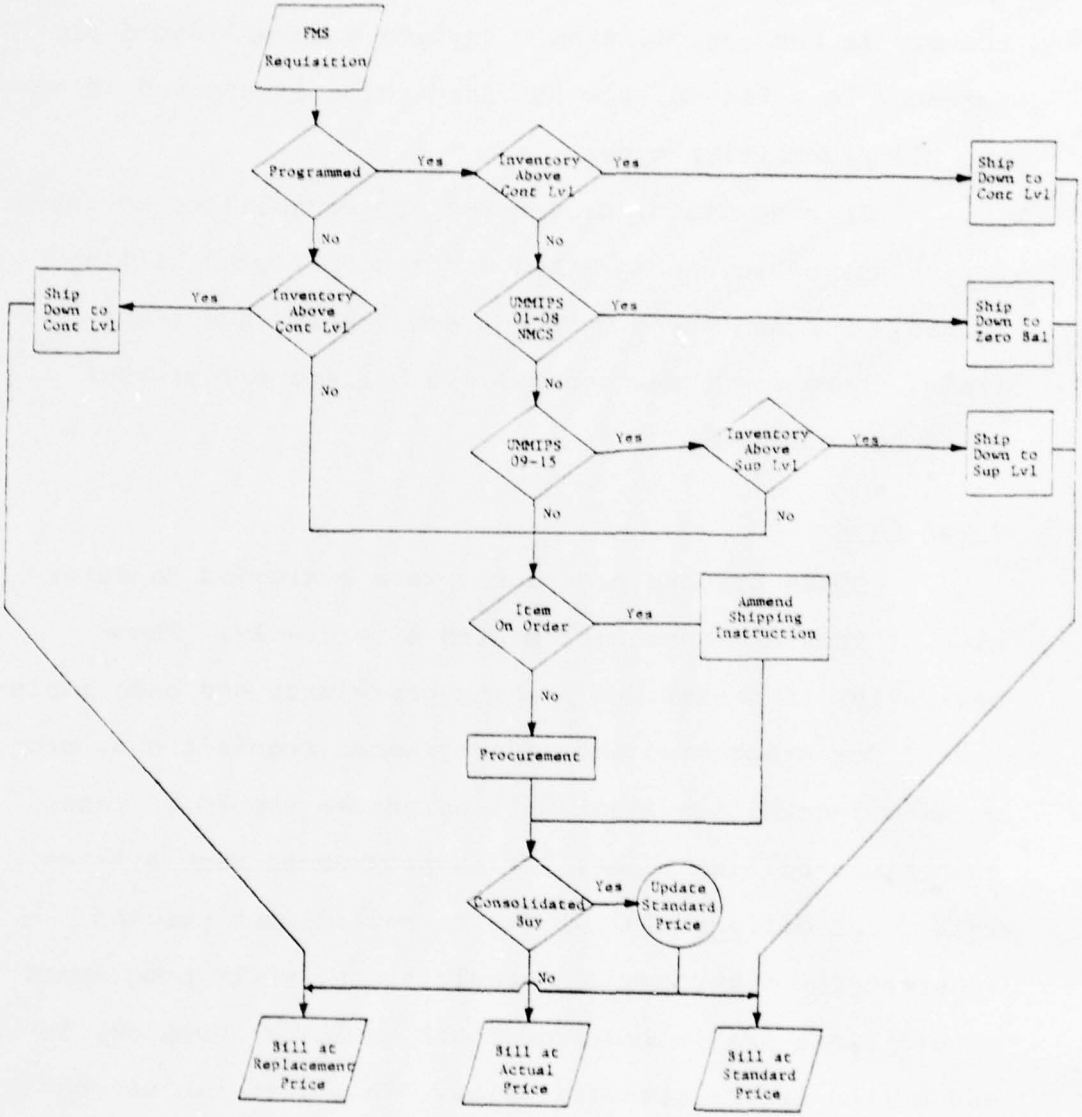


Fig. 13. FMS/CLSSA Requisition Pricing Decision Flow Chart for Recoverable Investment Type Items

is billed for both programmed and nonprogrammed requisitions when the item is obtained through procurement, and the buy is not consolidated. Anytime a consolidated procurement is achieved, the standard price is updated affecting all requisition types.

In conclusion, procedures are established to differentiate between programmed and nonprogrammed billing prices. For Air Force managed recoverable investment items, there are three generalized billing prices that could be incurred.

Question 2

CLSSA pricing procedures were evaluated to determine if they had been implemented effectively. Theoretically, if prescribed pricing procedures had been implemented for programmed and nonprogrammed requisitions, programmed requisition final billing prices should be less than final billing prices for nonprogrammed requisitions. This price differential is due to replacement pricing incurred for nonprogrammed requisitions, while programmed requisitions are filled from stock to lower inventory levels and billed at the standard price. This scenario was not supported by the statistical test of the research hypothesis which revealed that programmed requisitions were less than nonprogrammed requisitions in only 29.41 percent of the cases examined.

Examination of the historical data indicated that for some stock numbered items, pricing procedures were identical for programmed and nonprogrammed requisitions. One item in particular, 4320-00-737-1397RX (Rotary pump), had the same price for programmed and nonprogrammed requisitions from 1970 to 1979. In 1979, the price was increased the same amount for both requisition types. A second item, 6620-00-058-5225 (Transmitter), also had a constant price from 1972 through 1978. Appendix F contains a graphic plot of requisition prices for both these items over the period 1970 through 1979. These two items reflect a lack of differentiation in pricing procedures for programmed and nonprogrammed requisitions. Either replacement pricing with inflation factors for nonprogrammed items was not implemented, or if implemented, no distinction was made between CLSSA requisition types.

To further investigate implementation of pricing procedures from 1970 through 1979, personal interviews were conducted with International Logistics Accounting personnel (14; 29). The pricing decision flow chart, Figure 13, was reviewed and determined to be accurate. If the established pricing procedures were implemented correctly, over a number of years, the CLSSA participant should achieve lower requisition costs for programming his requirements in the FMSO I. The difficulty in achieving different prices lies in the requirement for the IMs to manually

apply replacement pricing. To implement replacement pricing, the IM must override the DO32, Stock Control and Distribution System, which provides data to the HO51 for documentation, and the HO75B for billing (Figure 12). Additionally, the IM must monitor the stock level status to implement effectively CLSSA pricing procedures according to the type of requisition and its UMMIPS priority. The International Logistics Accounting personnel interviewed identified the requirement for the IM to accomplish replacement pricing actions manually as a major contributor to ineffective implementation of pricing procedures.

Supported by the results of the test of the research hypothesis, established pricing procedures are not being accomplished. Are CLSSA participants penalized for prespecifying and prefunding their requirement in the FMSO I? Either there is no price benefit for establishing a CLSSA, or ineffective replacement pricing has negated any price advantage. Examination of pricing procedures has shown that a price advantage should exist for participation in the CLSSA. Ineffective manual replacement pricing, caused by the inability of the HO75B to distinguish automatically between programmed and nonprogrammed CLSSA requisitions, was identified.

Summary of Research Results

Results of the statistical test of the research hypothesis verified that there is a significant difference in final billing prices for programmed and nonprogrammed CLSSA requisitions, although no set pricing pattern was distinguishable. Evaluation of the first research question identified the existence of different pricing procedures for programmed and nonprogrammed requisitions. The second research question highlighted ineffective implementation of the procedures delineated in question one. In light of these results, the researchers present their conclusions and recommendations in the final chapter.

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

Introduction

This chapter finalizes the research effort. The research hypothesis has been tested; the research questions have been answered; and the research objectives have been achieved. Thus, insight has been provided into the identified problem: A need exists to identify and evaluate pricing relationships for programmed versus nonprogrammed requisitions.

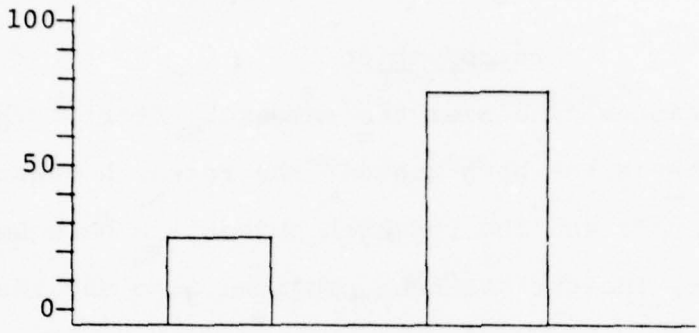
Conclusions

Research Hypothesis

Hypothesis. A significant difference exists in final billing prices for programmed versus nonprogrammed CLSSA requisitions.

Summary. The researchers tested the hypothesis for 34 selected stock numbered items, and a significant difference was found between programmed and nonprogrammed mean final billing prices for 55.88 percent of the NSNs analyzed (Figure 11). From the FMS customers' perspective, there is no financial benefit to participate in a CLSSA when final billing prices for programmed requisitions are

equal to or higher than identical nonprogrammed requisitions. This situation existed for 70.59 percent of the 34 NSNs examined (Figure 14).



	P<NP	P≥NP	Totals
Count:	10	24	34
Percent:	29.41	70.59	100.00%

Fig. 14. CLSSA Relative Perspective (1980 FY constant dollars)

Conclusion. A significant difference existed between programmed and nonprogrammed requisition mean final billing prices in a majority of the cases examined. However, programmed requisition mean final prices were significantly less than identical nonprogrammed requisition prices only 29.41 percent of the time.

Research Questions

Question 1. Is there a difference in actual procedures for determining billing prices for programmed and nonprogrammed requisitions?

Summary. The requisition pricing decision flow chart (Figure 13) developed in Chapter IV, verified that there is a difference in procedures for determining final billing prices for programmed and nonprogrammed requisitions. Three possible outcomes were identified: standard price, actual price, and replacement price.

Conclusion. There is a difference in pricing procedures for programmed and nonprogrammed requisitions.

Question 2. Have prescribed pricing procedures effectively been implemented for processing CLSSA programmed and nonprogrammed requisitions?

Summary. Discrepancies were identified between regulations governing CLSSA pricing procedures. To avoid this problem, the researchers relied on the pricing decision chart developed to answer question 1 (Figure 13). If these procedures were followed, prices should be less for programmed requisitions due to: advanced procurement and stocking of programmed (FMSO I) items, shipments below the control level for programmed items, and replacement pricing incurred by nonprogrammed requisitions. The results obtained by the test of the research hypothesis did not support this assumption. Programmed requisition mean final billing prices were significantly less than

nonprogrammed requisitions in only 29.41 percent of the cases examined.

Conclusion. Pricing procedures for programmed and nonprogrammed requisitions have not been implemented effectively.

Recommendations

Programmed CLSSA requisitions require increased management attention. This could be effected through the establishment of a programmed requisition management/review unit within the Air Force Logistics Command. This unit would be responsible for monitoring the financial aspects of processing CLSSA requisitions and insuring compliance with established regulations and directives. Attention should be directed towards an evaluation of Item Manager inventory management with respect to processing programmed and nonprogrammed requisitions.

A programmed requisition fund manager, similar to an industrial or stock fund manager, should be established. This manager would be responsible for the effective and efficient management of programmed items. Performance reporting should be developed to insure proper management. In addition, periodic reviews should be accomplished by the AFLC programmed requisition management unit to insure compliance with pricing policy and procedures.

Management action has been initiated to correct discrepancies existing between Air Force regulations with respect to CLSSA programmed and nonprogrammed requisitions. Air Force Regulation 170-3 is planned to be updated 1 October 1979 to reflect the distinction made in AFR 400-3 between requisition types within the CLSSA (29). Additionally, automated accounting procedures, based on AFR 170-3, will be introduced by two Data Automation Requirements (DARs). DAR PEN-LOG-ACF-H78-039, when implemented, will compute replacement pricing for secondary items (2). DAR LOG-ACR-H78-005 will implement direct financing for "K"-case programmed and nonprogrammed requisitions. Provisions will also be made to tie JO41 procurement price data directly to the HO51 accounting system (1). These procedures, to be introduced in October, 1979, should eliminate many of the pricing problems for CLSSA requisitions identified in the study. Management attention should be given to monitor these procedural changes to insure effective implementation.

Further research is recommended to increase the sample size beyond the limits of this study. Effort should be directed to the matching of programmed and nonprogrammed requisitions by transaction dates. Emphasis should be given to requisitions since 1977 when inflation factors were introduced to accomplish replacement pricing.

Attention should also be directed toward the evaluation of service code B and C pricing policies and procedures.

Recurring research, to investigate CLSSA pricing policies and procedures, is recommended because changes are continuously being made which will affect the results and conclusions developed during this study. Thus, continued research is warranted to insure the CLSSA is a workable alternative for FMS follow-on support.

APPENDICES

APPENDIX A

GLOSSARY

programmed requisition and inventory above the

level, replacement pricing is required. The actual price

Actual Price--price paid to a contractor for nonconsolidated buys by an Item Manager.

Analysis of Variance (ANOVA)--a statistical technique to compare several arithmetic means to determine if those means are equal.

Blanket Order Case--a FMS case established for the purchase of specific items over an extended period of time, up to the dollar limit of the case (30:A1-3).

Case--a FMS transaction or agreement between the U.S. and an eligible foreign country which is identified by a coded FMS identifier (36:2).

Central Limit Theorem--a proposition which states as the sample size increases (to approximately 30) the distribution of the mean of a random sample taken from practically any population approaches a normal distribution (38:151).

Constant Year Dollars--prices which have been transformed by use of a numerical index to provide a constant base year for comparison.

Control Level--level based on an average two-year demand plus lead time. If, for example, historical demand for an item had been one per month and had a lead time of 14 months, its control level would be 38 (24+14).

Cooperative Logistics Supply Support Arrangement (CLSSA)--an arrangement which provides a FMS customer the opportunity to actively participate in the DOD inventory system for follow-on support.

Defined Order Case--a FMS case established for the purchase of specific items and quantities at one given time (30:A1-3).

Direct Financing--an umbrella term that includes nonreimbursable and reimbursable transactions for the same case.

Final Billing Price--basic requisition price as stated in the H051, International Logistics Centralized Accounting and Reporting System, exclusive of add-ons such as surcharges.

Follow-on Support--logistical support of spare and repair parts to an FMS customer to augment initial support and maintain in-country systems.

Force Activity Designator (FAD)--a code designation, assigned at the Joint Chiefs of Staff level, to specifically measure the critical importance or priority for various requisitions.

Foreign Military Sales (FMS)--the sale of U.S. defense items and services to friendly foreign countries and organizations under the authority of the Foreign Military Sales Act of 1968.

Grant Aid--form of security assistance where defense items and services are given to a foreign country or organization without reimbursement to the United States.

Initial Support--initial logistical support of spare and repair parts to an FMS customer.

Long Supply--stockage in excess of the control level.

Metric Variables--classification by numerical values such as various prices, temperatures, etc.

Nonmetric Variables--classification of variables according to their categorical division rather than in numerical terms; e.g., programmed and nonprogrammed requisitions.

Replacement Pricing--additional costs to augment the standard price incurred by using inflation factors.

Recoverable Investment Item--spare/repair part items subject to depot level repair.

Secondary Item--spare or repair line item which does not include aircraft engines.

Security Assistance--policy of the United States which supports defined objectives of international peace and security by providing through sale or direct aid, military defense items or services to friendly foreign countries or organizations.

Simple Random Sample--selection of elements from a population with equal probability of selection.

Standard Price--the current price listed for a stock numbered item in the DOD inventory. This is the base price without additional costs.

Supply Support Arrangement (SSA)--same definition as Cooperative Logistics Supply Support Arrangement.

Support Level--level based on an average thirty-day demand.

Systematic Sampling--random selection of an initial sample element followed by continuous selection of elements equi-distant from each other.

APPENDIX B

SPSS PROGRAM

```
1000**s,r(sl) :,8,16;;,16
1005$:IDENT:WP1186,AFIT/LSG BREED-WINN 79B
1010$:SELECT:SPSS/SPSS
1015COMMENT
1020RUN NAME;CLSSA PROGRAMMED VERSUS NONPROGRAMMED REQUISITIONS
1025VARIABLE LIST;NUM SERCODE REQTYPE YR DAY PRICE
1030COMMENT
1035COMMENT;ESTABLISH SUBFILE STRUCTURE BY STOCK
1040COMMENT;NUMBERED ITEMS  (2488 CASES)
1045SUBFILE LIST;SUB1(73) SUB2(93) SUB3(61) SUB4(95) SUB5(77)
1050;SUB6(84) SUB7(84) SUB8(84) SUB9(73) SUB10(73) SUB11(78)
1055;SUB12(96) SUB13(83) SUB14(63) SUB15(71) SUB16(83)
1060;SUB17(76) SUB18(78) SUB19(70) SUB20(73) SUB21(73)
1065;SUB22(63) SUB23(67) SUB24(72) SUB25(65) SUB26(67)
1070;SUB27(62) SUB28(62) SUB29(65) SUB30(63) SUB31(68)
1075;SUB32(66) SUB33(62) SUB34(65)
1080COMMENT
1085INPUT MEDIUM;CARD
1090INPUT FORMAT;FIXED(2X,F3.0,2X,F1.0,2X,F1.0,2X,F1.0,F3.0,1X,F8.2)
1095COMMENT
1100COMMENT;DOD PRICE ESCALATION INDICES (DEFLATORS)
1105COMMENT;USED TO CONVERT REQUISITION FINAL BILLING PRICES
1110COMMENT;TO FY1980 CONSTANT DOLLARS BASED ON PROCESSING DATE
1115IF;(YR EQ 0 AND DAY LT 182) BYP = PRICE / 0.529
1120IF;(YR EQ 0 AND DAY GE 182) BYP = PRICE / 0.553
1125IF;(YR EQ 1 AND DAY LT 182) BYP = PRICE / 0.553
1130IF;(YR EQ 1 AND DAY GE 182) BYP = PRICE / 0.574
1135IF;(YR EQ 2 AND DAY LT 183) BYP = PRICE / 0.574
1140IF;(YR EQ 2 AND DAY GE 183) BYP = PRICE / 0.598
1145IF;(YR EQ 3 AND DAY LT 183) BYP = PRICE / 0.598
1150IF;(YR EQ 3 AND DAY GE 183) BYP = PRICE / 0.637
1155IF;(YR EQ 4 AND DAY LT 182) BYP = PRICE / 0.637
1160IF;(YR EQ 4 AND DAY GE 182) BYP = PRICE / 0.712
1165IF;(YR EQ 5 AND DAY LT 182) BYP = PRICE / 0.712
1170IF;(YR EQ 5 AND DAY GE 182) BYP = PRICE / 0.765
1175IF;(YR EQ 6 AND DAY LT 183) BYP = PRICE / 0.765
1180IF;(YR EQ 6) BYP = PRICE / 0.790
1185IF;(YR EQ 6 AND DAY GE 274) BYP = PRICE / 0.814
1190IF;(YR EQ 7 AND DAY LT 273) BYP = PRICE / 0.814
1195IF;(YR EQ 7 AND DAY GE 273) BYP = PRICE / 0.849
1200IF;(YR EQ 8 AND DAY LT 273) BYP = PRICE / 0.849
1205IF;(YR EQ 8 AND DAY GE 273) BYP = PRICE / 0.992
1210IF;(YR EQ 9) BYP = PRICE / 0.992
1215COMMENT
1220VAR LABELS;NUM,SEQ NUMBER/SERCODE,SERVICE CODE/
1225;REQTYPE,TYPE OF REQUISITION/YR,YEAR OF REQUISITION/
1230;DAY,DAY OF REQUISITION/PRICE,FINAL BILLING PRICE/
1235;BYP,FINAL BILLING PRICE 1980 BASE/
1240VALUE LABELS;REQTYPE (1)PROGRAMMED (2)NONPROGRAMMED/
1245;SERCODE (1)SERVICE CODE A (2)SERVICE CODE B/
1250;(3)SERVICE CODE C/
1255COMMENT
```

```
1260PRINT FORMATS;NUM,SERCODE,REQTYPE,YR,DAY(0)/
1265;PRICE,BYP (2)/
1270COMMENT
1275COMMENT;CONSTRUCT FREQUENCY DISTRIBUTION FOR REQUISITIONS
1280COMMENT;OVER 10 YEAR DATA BASE (PROGRAMMED)
1285TASK NAME;FREQUENCY DISTRIBUTION (PROGRAMMED)
1290*SELECT IF;(REQTYPE EQ 1)
1295RUN SUBFILES;ALL
1300FREQUENCIES;INTEGER=YR(0,9)
1305OPTIONS;3,8
1310STATISTICS;ALL
1315COMMENT
1320COMMENT;CONSTRUCT FREQUENCY DISTRIBUTION FOR REQUISITIONS
1325COMMENT;OVER 10 YEAR DATA BASE (NONPROGRAMMED)
1330TASK NAME;FREQUENCY DISTRIBUTION (NONPROGRAMMED)
1335*SELECT IF;(REQTYPE EQ 2)
1340RUN SUBFILES;ALL
1345FREQUENCIES;INTEGER=YR(0,9)
1350OPTIONS;3,8
1355STATISTICS;ALL
1360COMMENT
1365READ INPUT DATA
1370$:SELECTA:SSADATA
1375COMMENT
1380COMMENT;PERFORM ONE-WAY ANOVA TESTING EFFECT OF
1385COMMENT;REQTYPE (PROGRAMMED,NONPROGRAMMED) ON FINAL
1390COMMENT;BILLING PRICES FOR EACH STOCKED NUMBERED ITEM
1395TASK NAME;ONE-WAY ANOVA BY STOCK NUMBER
1400RUN SUBFILES;EACH
1405ONEWAY;BYP,PRICE BY REQTYPE (1,2)/
1410OPTIONS;1
1415STATISTICS;ALL
1420COMMENT
1425COMMENT;CONSTRUCT PLOT OF REQUISITION PRICES (UNINDEXED)
1430COMMENT;OVER THE 10 YEAR DATA BASE
1435TASK NAME;GRAPHIC PLOT PRICE OVER TIME
1440RUN SUBFILES;EACH
1445SCATTERGRAM;PRICE BYP WITH YR (0,9)
1450OPTIONS;7
1455STATISTICS;ALL
1460COMMENT
1465FINISH
1470$:ENDJOB
```

APPENDIX C

LISTING OF 34 STOCK NUMBERED ITEMS (NSNs) *AND CORRESPONDING DESCRIPTION*

NATIONAL STOCK NUMBER					ITEM DESCRIPTION
1270	00	139	1507		Radar Set Indicator
1270	00	476	7946		Optical Amplifier
1560	00	739	8339	XE	Aircraft Assembly Gear Box
1660	00	010	4984		Aircraft Turbine
1660	00	793	5799		Pressure Regulator
1660	00	798	3210		Aircraft Co. Turbine
2620	00	087	4523		Pneumatic Tire
2840	00	780	3486	RX	Turbine Nozzle
2915	00	021	8556	RX	Engine Governor
2920	00	060	0056	YP	Electric Engine Starter
2925	00	805	6481	RX	Ignition Exciter
2995	00	179	8730		Box Assembly Throttle
2995	00	475	0698	RX	Nozzle Power Unit
3110	00	903	6776	RX	Cylinder Roller Bearing
4320	00	737	1397	RX	Rotary Pump
4810	00	962	4394	BF	Regulating Valve
5821	00	001	2756		Electric Synthesizer
5930	00	168	8051	YP	Electrical Switch
5960	00	061	0487		Electron Tube
6110	00	097	8395	BF	Voltage Regulator Panel
6110	00	571	7654	BF	Motor Controller
6110	00	925	9954		Frequency Control
6115	00	586	3950	UH	Alternating Generator
6340	00	015	8049		Fire Control Unit
6340	00	116	5963	BF	Indicator Pressure Control
6605	00	866	7765		Electronic Amplifier
6610	00	110	9455		Air Intercept Computer
6610	00	427	9220		Horizontal Indicator
6615	00	796	1166	BF	Rate Gyroscope
6615	00	973	2657		Rate Gyroscope
6620	00	058	5225		Rate Transmitter
6620	00	421	2223		Rate Transmitter
6645	00	076	3050		Mechanical Aircraft Clock
6680	00	878	6133		Liquid Quantity Indicator

APPENDIX D

RESULTS OF ANALYSIS OF VARIANCE TESTS OF THE NULL HYPOTHESIS (H_o: $U_1 = U_2$) FOR EACH OF THE 34 SELECTED NSNs

Examples of SPSS ONEWAY Analysis of Variance Output Report:

1. NSN 1560 00 739 8339 XE
2. NSN 6115 00 586 3950 UH
3. NSN 6610 00 427 9220

National Stock Number	Sample Size	Mean Prices		F Ratio	F Crit	H_0 $U_1:U_2$	Result
		Prog	Nonprog				
1270 00 139 1507	83	16828.03	22482.83	26.858	3.97	≠	P<NP
1270 00 476 7946	64	13325.53	12504.80	4.182	4.00	≠	P>NP
1560 00 739 8339 XE	83	1778.12	2088.19	36.610	3.97	≠	P<NP
1660 00 010 4984	61	2740.83	2423.86	2.742	4.00	=	P=NP
1660 00 793 5799	72	1529.16	1528.11	0.001	3.98	=	P=NP
1660 00 798 3210	66	2785.27	2965.06	9.863	3.99	≠	P<NP
2620 00 087 4523	66	198.87	192.55	2.665	3.99	=	P=NP
2840 00 780 3486 RX	82	3084.09	2991.83	1.814	3.97	=	P=NP
2915 00 021 8556 RX	72	1829.90	1717.10	1.487	3.98	=	P=NP
2920 00 060 0056 YP	72	1112.61	837.67	35.959	3.98	≠	P>NP
2925 00 805 6481 RX	77	758.93	725.61	0.363	3.97	=	P=NP
2995 00 179 8730	62	617.74	570.97	8.144	4.00	≠	P>NP
2995 00 475 0698 RX	95	4338.70	5772.82	23.353	3.96	≠	P<NP
3110 00 903 6776 RX	82	152.91	166.30	18.681	3.97	≠	P<NP
4320 00 737 1397 RX	61	1067.19	1173.99	2.778	4.00	=	P=NP
4810 00 962 4394 BF	64	414.48	442.83	1.222	4.00	=	P=NP
5821 00 001 2756	62	3821.36	3804.42	0.006	4.00	=	P=NP
5930 00 168 8051 YP	67	591.53	562.43	5.747	3.99	≠	P>NP
5960 00 061 0487	62	9437.78	9518.37	0.190	4.00	=	P=NP
6110 00 097 8394 BF	70	1594.50	1826.47	33.253	3.98	≠	P<NP
6110 00 571 7654 BF	65	2212.00	1988.22	14.804	3.99	≠	P>NP
6110 00 925 9954	61	2256.70	2245.69	0.036	4.00	=	P=NP
6115 00 586 3950 UH	77	1819.30	1700.34	1.479	3.97	=	P=NP
6340 00 015 8049	71	352.46	390.76	6.136	3.98	≠	P<NP
6340 00 116 5963 BF	75	509.72	571.62	4.842	3.98	≠	P<NP
6605 00 866 7765	72	1111.36	981.58	13.915	3.98	≠	P>NP
6610 00 110 9455	92	15820.01	16435.77	1.065	3.96	=	P=NP
6610 00 427 9220	60	4165.43	3001.97	16.943	4.00	≠	P>NP
6615 00 796 1166 BF	64	3359.99	2537.44	81.474	3.99	≠	P>NP
6615 00 973 2657	94	843.07	1180.04	32.567	3.96	≠	P<NP
6620 00 058 5225	76	1566.41	1662.41	1.915	3.98	=	P=NP
6620 00 421 2223	83	1415.84	1276.16	21.020	3.97	≠	P>NP
6645 00 076 3050	69	317.62	310.70	0.923	3.98	=	P=NP
6680 00 878 6133	72	1243.68	1366.26	14.149	3.98	≠	P<NP

CLASS PROGRAMMED VERSUS NONPROGRAMMED REQUISITIONS
ONE-WAY ANOVA BY STOCK NUMBER
FILE NONAME (CREATION DATE = 08/16/79)
SUBFILE SUBA NSN 1560 00 739 8339 XE

08/16/79 PAGE 4

- O N E W A Y -

VARIABLE BYP FINAL BILLING PRICE 1980 BASE

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	1	2008766.3026	2008766.2969	36.618	0.0000
WITHIN GROUPS	82	4499300.8320	54869.5225		
TOTAL	83	6508067.1250			

GROUP	COUNT	MEAN	STANDARD DEVIATION	STANDARD ERROR	MINIMUM	MAXIMUM	95 PCT CONF INT FOR MEAN
GRP01	39	1778.1192	106.8550	17.1105	1506.0484	1891.1392	1743.4888 TO 1812.7576
GRP02	45	2088.1934	303.9668	45.3127	1506.0484	2595.8188	1996.8716 TO 2179.5151
TOTAL	84	1944.2303	280.0187	30.5525	1506.0484	2595.8188	1883.4626 TO 2004.9981
FIXED EFFECTS MODEL			234.2424	25.5579			1893.3875 TO 1995.0732
RANDOM EFFECTS MODEL			219.7838	155.4106			-30.4479 TO 3918.9085

RANDOM EFFECTS MODEL - ESTIMATE OF BETWEEN COMPONENT VARIANCE 46759.9229

TESTS FOR HOMOGENEITY OF VARIANCES

COCHRANS C = MAX. VARIANCE/SUM(VARIANCES) = 0.8900, P = 0.000 (APPROX.)
BARTLETT-BOX F = 36.341, P = 0.
MAXIMUM VARIANCE / MINIMUM VARIANCE = 8.092

CLSSA PROGRAMMED VERSUS NONPROGRAMMED REQUISITIONS
ONE-WAY ANOVA BY STOCK NUMBER
FILE NONAME (CREATION DATE = 08/16/79)
SUBFILE SUB18 NSN 6115 00 586 3950UH

08/16/79 PAGE 5

- O N E W A Y -

VARIABLE BYP FINAL BILLING PRICE 1980 BASE

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	1	274347.6290	274347.6289	1.479	0.2277
WITHIN GROUPS	76	14097898.5625	185498.6660		
TOTAL	77	14372246.2500			

GROUP	COUNT	MEAN	STANDARD DEVIATION	STANDARD ERROR	MINIMUM	MAXIMUM	95 PCT CONF INT FOR MEAN
GRP01	42	1819.3047	487.0192	75.1487	448.2056	2265.3563	1667.5388 TO 1971.0706
GRP02	36	1700.3393	353.4808	58.9135	157.7247	2265.3563	1580.7386 TO 1819.9400
TOTAL	78	1764.3976	432.0330	48.9181	157.7247	2265.3563	1666.9892 TO 1861.8060
FIXED EFFECTS MODEL			430.6956	48.7667			1667.2704 TO 1861.5249
RANDOM EFFECTS MODEL			84.0338	59.4209			1089.3844 TO 2519.4109

RANDOM EFFECTS MODEL - ESTIMATE OF BETWEEN COMPONENT VARIANCE 2291.7391

TESTS FOR HOMOGENEITY OF VARIANCES

COCHRANS C = MAX. VARIANCE/SUM(VARIANCES) = 0.6550, P = 0.026 (APPROX.)
BARTLETT-BOX F = 3.704, P = 0.054
MAXIMUM VARIANCE / MINIMUM VARIANCE = 1.898

- O N E W A Y -

VARIABLE BYP FINAL BILLING PRICE 1980 BASE

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	1	20637294.6838	20637294.7500	16.943	0.0001
WITHIN GROUPS	59	71863466.1250	1218024.8438		
TOTAL	60	92500761.0000			

GROUP	COUNT	MEAN	STANDARD DEVIATION	STANDARD ERROR	MINIMUM	MAXIMUM	95 PCT CONF INT FOR MEAN
GRP01	30	4165.4252	415.0504	75.7775	3542.3387	4723.5872	4010.4428 TO 4320.4075
GRP02	31	3001.9695	1492.9582	268.1432	640.5444	4816.4557	2454.3481 TO 3549.5910
TOTAL	61	3574.1608	1241.6438	158.9762	640.5444	4816.4557	
FIXED EFFECTS MODEL			1103.6416	141.3068			3256.1611 TO 3892.1606
RANDOM EFFECTS MODEL			822.7849	581.7968			3291.4065 TO 3856.9152
							-3818.2651 TO 10966.5868

RANDOM EFFECTS MODEL - ESTIMATE OF BETWEEN COMPONENT VARIANCE 636868.5313

TESTS FOR HOMOGENEITY OF VARIANCES

COCHRANS C = MAX. VARIANCE/SUM(VARIANCES) = 0.9283, P = 0.000 (APPROX.)
BARTLETT-BOX F = 38.085, P = 0.
MAXIMUM VARIANCE / MINIMUM VARIANCE = 12.939

APPENDIX E

SUMMARY RESULTS OF ANALYSIS OF VARIANCE TESTS RESTRICTED TO THE YEARS 1976 THROUGH 1979

In light of the uneven distribution of requisition types over the ten years of data (Figure 10), the researchers evaluated the research hypothesis of equal means (H_o: $U_1=U_2$) for the years 1976 through 1979. To perform this statistical analysis the original sampling plan was not followed. Less than thirty nonprogrammed requisition final prices were available for each of the thirty-four stock numbered items. The results of the individual ANOVA tests are graphically summarized in this appendix.

Based on the 1976 through 1979 data, the reduced sample size decreased the ability of the ANOVA tests (α=.05) to distinguish programmed requisition mean prices from nonprogrammed mean prices. The null hypothesis was accepted in twenty-four cases (70.85 percent), indicating no difference in mean final prices. In those cases where a significant difference was identified, only two stock numbered items (5.88 percent) supported the contention that programmed requisitions should cost the FMS customer less than nonprogrammed requisitions for identical items.

Although there is an increased inability to distinguish between programmed and nonprogrammed mean final prices, this limited analysis reinforces the conclusion that from the FMS customers' perspective there is no financial benefit to participate in the CLSSA. Programmed

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COOPERATIVE LOGISTICS SUPPLY SUPPORT ARRANGEMENT PRICING RELATI--ETC(U)
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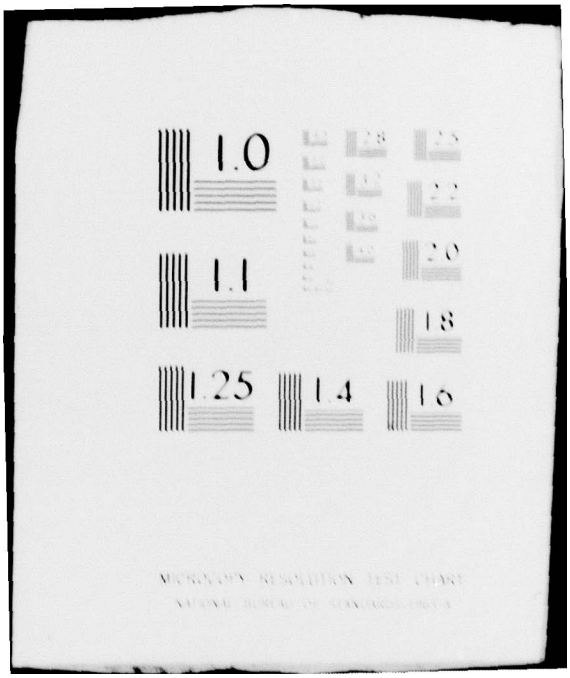
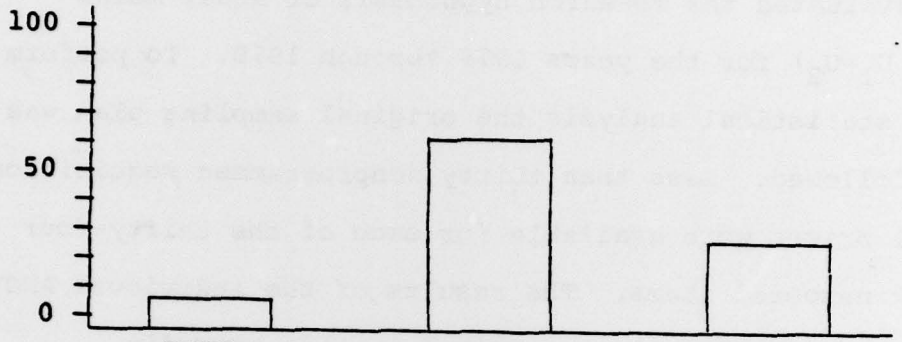
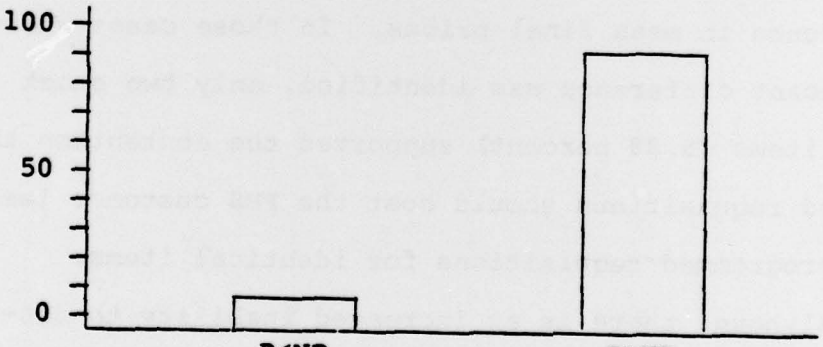

1.0
1.1
1.25
1.4
1.6
2.0
2.2
2.5
2.8
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

requisition final mean prices were equal to or higher than nonprogrammed final mean prices for 94.12 percent of the NSNs examined.



	P<NP	P=NP	P>NP	Totals
Count:	2	24	8	34
Percent:	5.88	70.58	23.54	100.00%

ANOVA RESULTS, 1976-1979



	P<NP	P≥NP	Totals
Count:	2	32	34
Percent:	5.88	94.12	100.00%

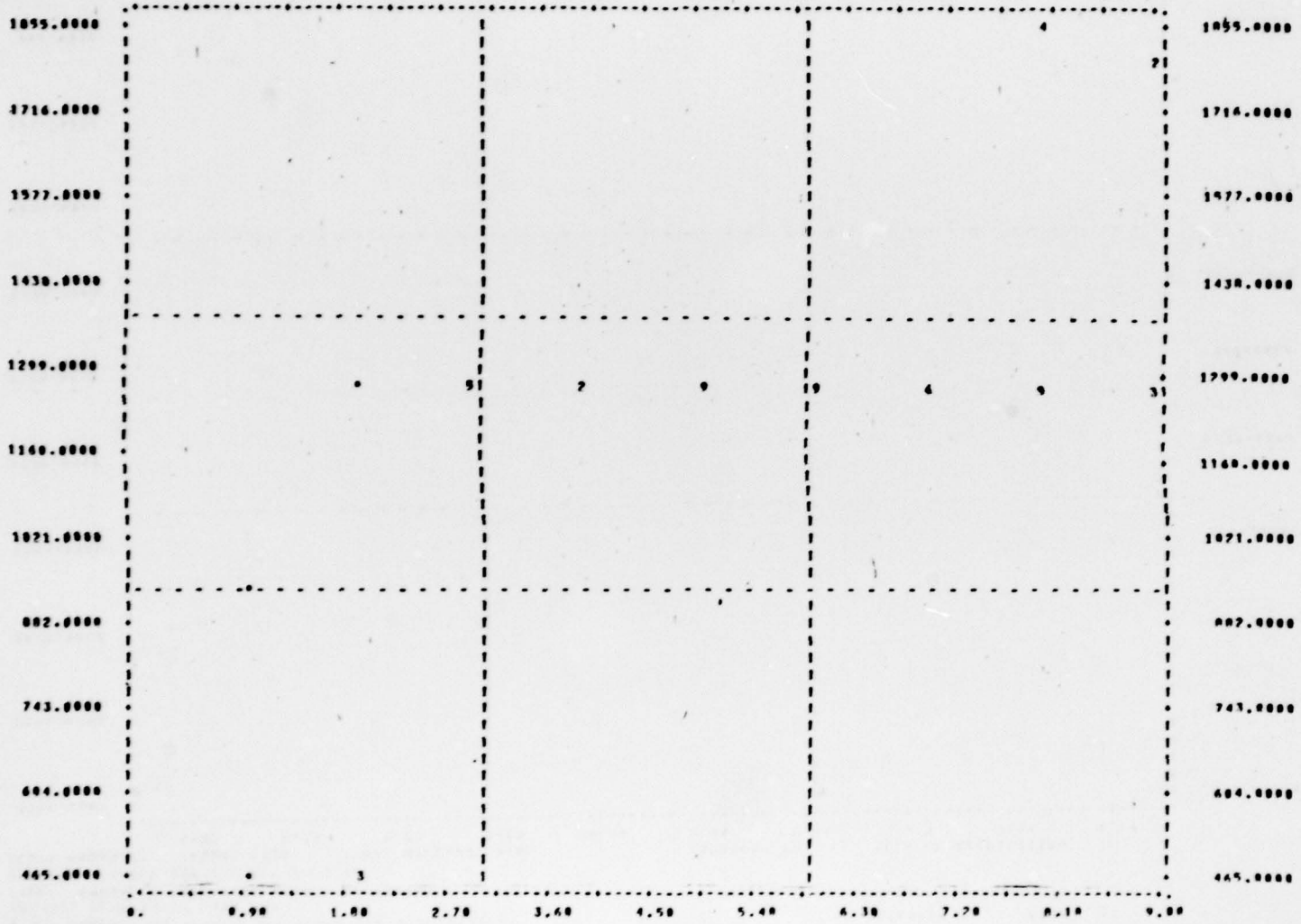
CLSSA RELATIVE PERSPECTIVE, 1976-1979

APPENDIX F

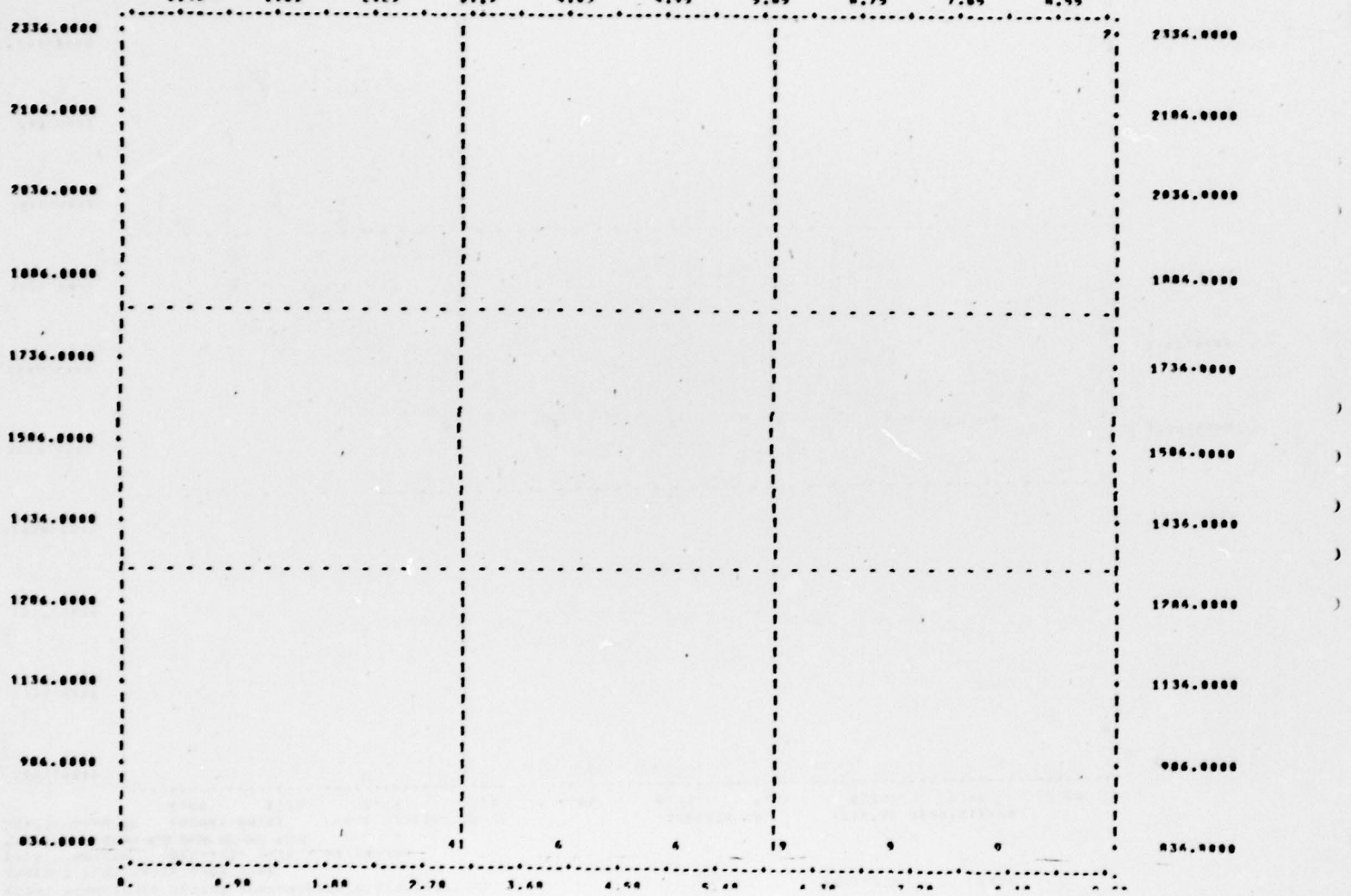
GRAPHIC PLOTS OF REQUISITION PRICES

1. NSN 6620 00 058 5225
2. NSN 4320 00 737 1397 RX

CLSSA PROGRAMMED VERSUS NONPROGRAMMED REQUISITIONS 08/16/79 PAGE 7
GRAPHIC PLOT PRICE OVER TIME
FILE NONAME (CREATION DATE = 08/16/79)
SUBFILE SUBS NSN 6620 00 058 5225
SCATTERGRAM OF (DOWN) PRICE FINAL BILLING PRICE (ACROSS) YR YEAR OF REQUISITION



CLSSA PROGRAMMED VERSUS NONPROGRAMMED REQUISITIONS 08/16/79 PAGE 11
GRAPHIC PLOT PRICE OVER TIME
FILE NONAME (CREATION DATE = 08/16/79)
SUBFILE SW020 NSN 4320 00 737 1397RX
SCATTERGRAM OF (DOWN) PRICE FINAL BILLING PRICE (ACROSS) YR YEAR OF REQUISITION



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